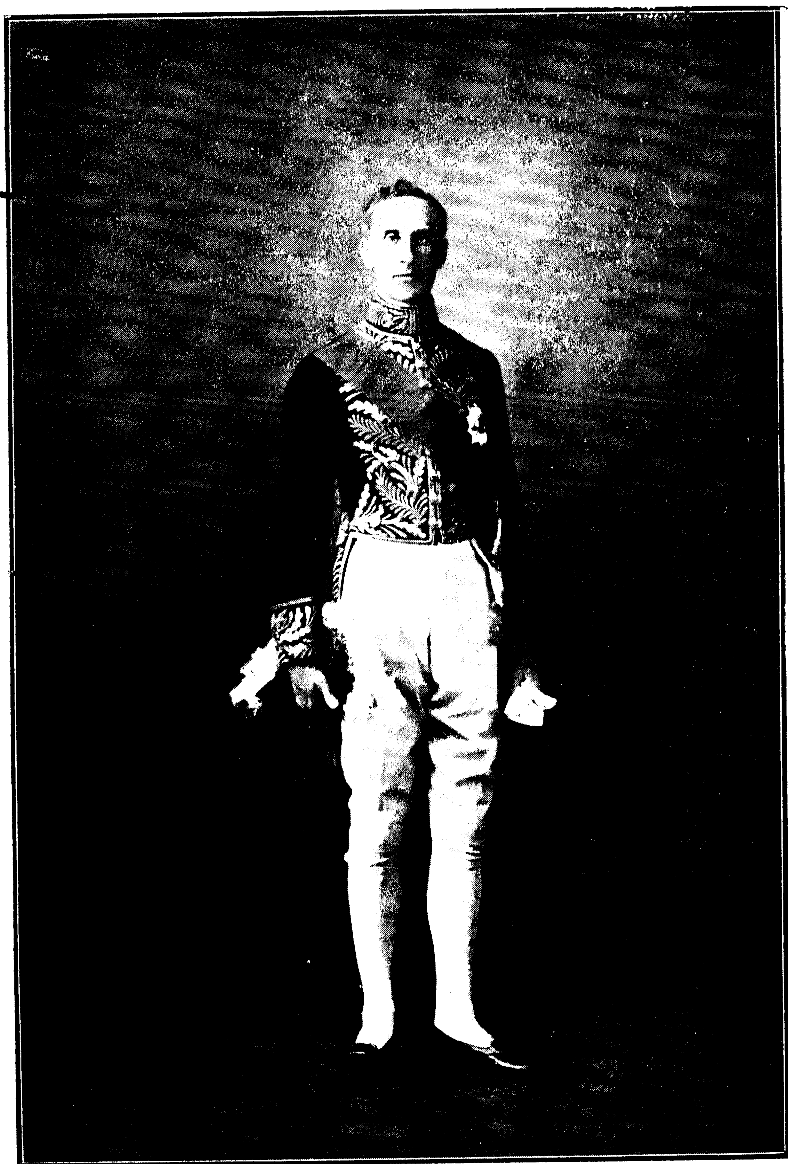
Kaisir-i-Hind

CONTENTS.



H. E. The Governor.

PREFACE.

Some difficulty has been experienced in preparing this guide book owing to the delay on the part of exhibitors in furnishing complete information in regard to their exhibits. Information supplied up to the 23rd November has been printed and descriptions of most of the exhibits have been included. The Art Press extended the time of going to press to the latest possible moment and then worked night and day to produce the book in time.

Appendix A giving some historical account of the growth of the commerce of Bengal and particularly of Calcutta, and Appendix B which tells the story of the development of the Port of Calcutta, have been included by request. The story of the expansion of that trade and commerce in the last 300 years cannot but inspire the present and future generations to aim at still greater things. *Noblesse oblige.*

The Editor gratefully acknowledges the assistance of the Hon. Mr. H. E. A. Cotton, President of the Bengal Legislative Council, Babu Narendra Nath Ganguli of the Imperial Records Department, Rai Chuni Lal Bose Bahadur, Mr. A. F. M. Abdul Ali, Khan Bahadur Asaduzzaman, Mr. P. Lancaster, Dr. D. B. Meek and Mr. Stuart Williams. The secretaries of the various sub-committees have also readily lent their aid.

CALCUTTA EXHIBITION, 1923.

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CHAPTER I.

THE EXHIBITION AND ITS ORGANISATION.

The British Empire Exhibition.

In 1913 the late Lord Strathcona proposed the organisation of a great British Empire Exhibition to be held in London. Although such an Exhibition was even then long overdue the scheme had to be postponed owing to the war but it was not abandoned and it was revived by the British Empire League immediately after the Armistice. In June 1919 a provisional Committee was appointed to draw up plans and soon afterwards His Majesty the King-Emperor graciously consented to become Patron of the enterprise. A year later, in June 1920, at the request of His Royal Highness the Prince of Wales the project was formally launched at a meeting held at the Mansion House, London. The resolution launching the project reads "That this meeting at the Mansion House, under the presidency of the Right Hon'ble the Lord Mayor of London, cordially endorses the proposal to hold in London a Great Exhibition *for the purpose of promoting trade within the Empire*, and pledges itself to give the project its whole-hearted support". It had first been intended to hold the Exhibition in 1921 but at the request of the Colonies and of India the date was postponed to 1923 and on the subsequent request of India's representatives it was further postponed to 1924. The Exhibition will be opened in London in April 1924, and will remain open for six months. It will be held at Wembley Park and it is confidently expected to attract many millions of people from all parts of the world and

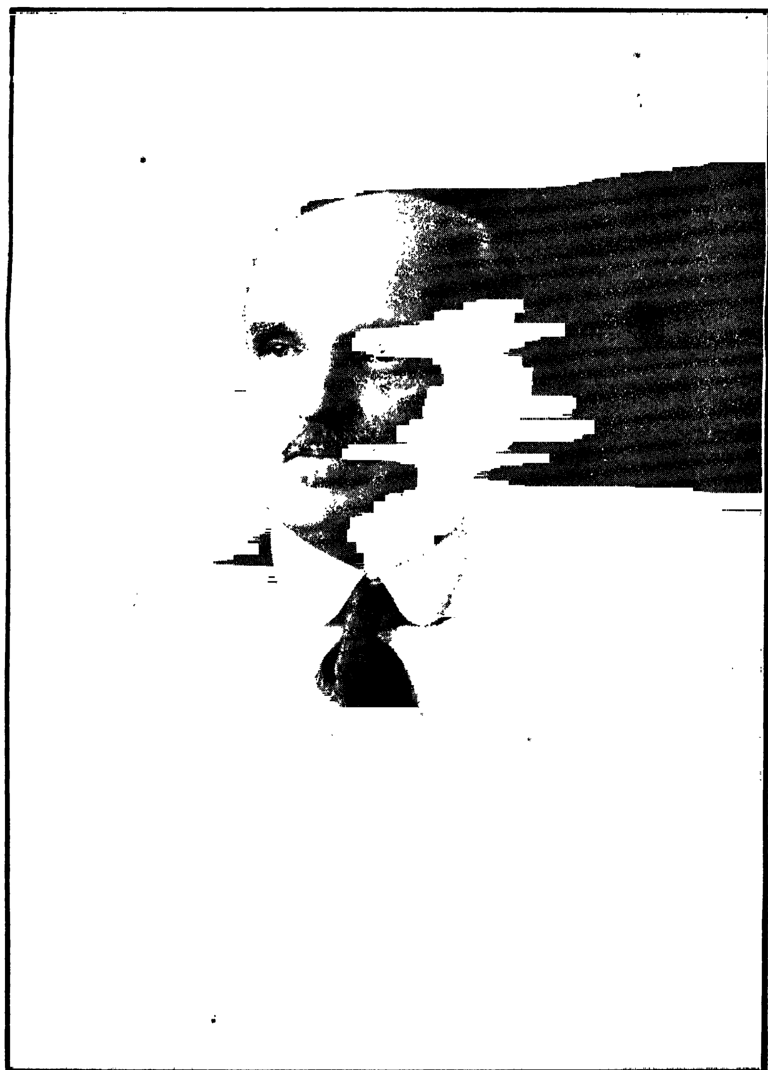
particularly of the British Empire to share in and witness the great display.

Early in 1922 the Legislative Assembly of India decided that India should participate in the British Empire Exhibition and agreed to spend twenty five lakhs of rupeees on the organisation and construction of the Indian Section. The Government of Burma decided to participate separately in the Exhibition. In the course of the year 1922, the Punjab, Madras, the United Provinces, Bombay, Bihar and Orissa, all decided to take courts within the Indian Section, but it was not until January, 1923, that, on the motion of the Hon'ble Minister, Nawab Saiyid Nawab Ali Chaudhuri, Khan Bahadur, C.I.E., the Bengal Legislative Council after a very full discussion decided that "This Council recommends to the Government that the Province of Bengal should participate in the British Empire Exhibition of 1924 and that with a view to this participation steps be taken to organise a preliminary Exhibition in Calcutta in the cold weather of 1923". This, in brief, is the origin of the idea of holding the Calcutta Exhibition. Originating an idea and giving effect to it are two very different things. When the Legislative Council had decided that Bengal should participate, His Excellency the Governor of Bengal lost no time in summoning a meeting representative of all the interests of the Province to take the steps necessary to give effect to the resolution of the Council. His Excellency graciously agreed to be Patron of the Calcutta Exhibition and a General Committee was appointed. The list of the General Committee is printed

India comes in.

Bengal decides to participate.

The Committees and Sub-committees.



MR. T. EMERSON, I.C.S., C.I.E.,
General Secretary.

at the beginning of this Guide Book. Its President is the Hon'ble Minister in charge of the portfolio of Agriculture and Industries and Public Works, Nawab Saiyid Nawab Ali Chaudhuri, Khan Bahadur, C.I.E., and Mr. T. Emerson, C.I.E., I.C.S., is General Secretary. The General Committee proceeded to hold its first meeting and appointed the Executive Committee, which at its first meeting took steps to organise the various Sub-committees. The Executive Committee has met several times during the year but, as more frequent meetings of some body armed with executive powers were necessary, the Executive Committee delegated considerable powers to a Sub-committee consisting of the General Secretary and Joint Secretaries. Not only has this Sub-committee met practically every week since last March and co-ordinated the activities of the organising Sub-committees but its members have undertaken a considerable amount of the actual work of organisation themselves.

The Guarantee Fund.

It was early recognised that a Guarantee Fund would be the surest means of making the Exhibition a success as it would give the Executive Committee or their representatives, the Committee of Secretaries, the necessary credit to go ahead with their organisation. The Government of Bengal advanced Rs. 50,000 to inaugurate the activities of the Committee but this was only a loan and it has to be repaid. A Finance Sub-committee was constituted and their first duty was to organise a Guarantee Fund. The first guarantee was for Rs. 50,000 and it came from the Royal Calcutta Turf Club. To those who know the Turf Club its ready response to the request for a guarantee came as no surprise. The reputation of the

Royal Calcutta Turf Club is world-wide but Calcutta claims the Club as its own and the Exhibition authorities naturally turned to it for aid for the Exhibition. Then came the Bengal Chamber of Commerce, another institution with a world-wide reputation but peculiarly Calcutta's own. In this time of trade depression it was not to be expected that the members of the Chamber of Commerce would be inclined to increase their risks but the President of the Chamber, Mr. W. L. Carey, M.L.C., one of the most active organisers of the Exhibition, pleaded so strongly for support by the Chamber that the proposed guarantee of a lakh of rupees was in a short time over-subscribed. The Bengal National Chamber of Commerce has given a guarantee of 75,000/- and their President Raja Reshee Case Law a guarantee of 25,000/-. Following these excellent examples the undermentioned gentlemen gave guarantees of the amounts indicated opposite their names.

LIST OF GUARANTORS.

		Rs.
1.	The Bengal Chamber of Commerce over	1,00,000
2.	Bengal National Chamber of Commerce	75,000
3.	The Royal Calcutta Turf Club ...	50,000
4.	Prince Victor of Cooch Behar ...	25,000
5.	Raja Reshee Case Law	25,000
6.	Raja Bijay Singh Dhudhuria of Azimganj	25,000
7.	Kumar Devendra Lal Khan of Narajole	20,000
8.	Mr. G. D. Birla	25,000
9.	,, B. N. Sirkar	10,000
10.	,, A. Stephen	10,000
11.	,, P. N. Tagore	10,000
12.	Rai Upendra Lal Roy Bahadur ...	10,000
13.	Rai Fanindra Lal Dey Bahadur ...	10,000
14.	The Hon'ble Chowdhury Muhammad Ismail Khan	10,000

		Rs.
15.	Mr. J. C. Galstaun	10,000
16.	Raja Satya Niranjan Chakrabarty of Hetampur	10,000
17.	Babu Surendra Narayan Sinha ...	10,000
18.	Kumar Arun Chandra Sinha of Paikpara	10,000
19.	Mr. P. Mukherjee	10,000
20.	The Hon'ble Raja Pramada Nath Ray of Dighapatia	10,000
21.	Messrs. A. Firpo Ld.	10,000
22.	Mr. J. N. Bose	10,000

This total guarantee gave the Committees and Sub-committees and all the workers for the Exhibition that confidence which was essential to their progress and, in particular, that support which enabled them to enter into contracts and incur the expenditure which has resulted in the buildings now seen on the Exhibition Grounds. Other Exhibitions have been financed by Government or by private individuals but it is the aim of the Calcutta Exhibition to finance itself, the preliminary expenses having been met by advances from the banks which the names of the guarantors enabled the Committee to secure.

The Finance Sub-committee which induced guarantors to give their guarantees was then strengthened by the addition to their number of Messrs. Carey and Crichton as specially interested in protecting the guarantors and this Sub-committee at its first full meeting demanded powers of scrutiny over every item of expenditure, powers which were readily conceded. The Sub-committee which was still further strengthened by the co-option of Mr. K. L. Datta, late Accountant-General, who drew up account forms and registers and gave very reliable technical advice,

continued to meet frequently and while their meetings were probably the most harmonious they were also perhaps the most important meetings that took place regularly in connection with the organisation of the Exhibition.

Thanks to the guarantee the Executive Committee and its delegates, the Secretaries' Committee, were very early able to invite tenders for the great amount of construction necessary for the Exhibition and they were fortunate in securing Messrs. Warren & Co. as contractors. Mr. Warren personally supervised the work which went rapidly ahead and he made many suggestions of improvement on the Committee's original ideas. Very early in the year the contractors set up their workshops in the Gardens and buildings began to grow up in the more unfrequented parts in June and July. The ready co-operation of the Commissioner of Police enabled the buildings to be gradually completed with the minimum of inconvenience to the public and to the same end too the Garden authorities gave the greatest assistance. The absence of all complaints from the public who frequent the Gardens is a testimony to the strategy of the Commissioner of Police, the Garden authorities and the contractors.

Publicity.

The Executive Committee very early appointed a Publicity Sub-committee and engaged the services of Messrs. Jackson & Co. as Publicity Agents. Though the sudden and tragic death of Mr. Jackson in September cast a gloom over his fellow-workers on the Publicity Committee and considerably interfered with its work, which owed so much to his energy, enthusiasm and originality, the publicity campaign planned by him was carried out as

far as possible. The Sub-committee brought out in June and for the following six months a bright little Magazine called the "Pagoda Tree", the official organ of the Exhibition. The editor, Mr. P. Lovett, in his inimitable style, so well appreciated throughout India, made the "Pagoda Tree" a success from the beginning and ere it was three months old suggestions began to come in that it should not cease to appear when the Exhibition was over. The Publicity Sub-committee may therefore have unwittingly contributed to the journalistic history of Calcutta and the "Pagoda Tree" may continue as a permanent memento of the Exhibition of 1923. Periodical advertisements and the collection of advertisements for the Exhibition hoarding and for display in the grounds were part of the programme of publicity. The great danger of advertisements for the hoarding was that they might prove unsightly but a glance at them, in themselves an exhibition of what publicity can be in the hands of capable experts, is a proof of the care and scrutiny which the Committee exercised. No small income was already assured in advance by this publicity campaign and the applications for space, which began to come in soon after publicity began, gave great heart to the organisers. One of the first results was the appointment of a manager, Mr. K. K. Bose, a young Bengali Engineer with 12 years' American experience, and the opening of an office to which frequent additions were necessary.

Objects of the Calcutta Exhibition.

The objects of the Exhibition are to improve the commerce, trade and industries of India by advertisement and display and to take the opportunity of selecting the exhibits which Bengal desires to send to the British Empire Ex-

hibition in London. The Calcutta Exhibition contains exhibits from all parts of India but only a small portion of these exhibits will go to London, chiefly for the Bengal court in the Indian Pavilion there. Although the conception of the Calcutta Exhibition originated in the decision of the Legislative Council to participate in the British Empire Exhibition, the Calcutta Exhibition is itself a separate independent undertaking. The area covered by the exhibits in Calcutta is about 100,000 square feet but the total area covered by Bengal exhibits at the British Empire Exhibition will scarcely exceed 12,000 square feet.

Depression in trade.

There has been a very serious trade depression in Calcutta for some years past and this depression has seriously affected the actual display in the Eden Gardens, for many, who in more prosperous times would have eagerly seized the opportunity of advertisement which the Exhibition offers, have been compelled by adverse circumstances to remain aloof, and this although they recognise that the time of adversity more than the time of prosperity is the occasion for advertising. The depression has been so great, however, that many of our well-wishers have of necessity abstained from participation in our display and we can but offer them our sympathy and trust that even to them the Exhibition will prove to be of assistance, for improvement in some branches of trade and commerce inevitably produces improvement all round.

Abstentions.

There are many who of necessity remained away and their abstention is intelligible. The abstention of certain classes who dreaded that the Exhibition might injure them by bringing forward competitors in their particular line is

a denial of the recognised truth that "competition is the life of trade" and they will certainly suffer by remaining away, for their competitors are in the Eden Gardens all the same. A third class of abstainers is those who think that on political grounds the British Empire Exhibition should not be supported and that therefore the Calcutta Exhibition, which is in some way associated with the British Empire Exhibition, should not be patronised, but this class is small and unimportant and the effect of their short-sighted policy can scarcely be noticed. Whatever our political opinions may be, the greater the commerce, the trade and the industries of India, and particularly of Bengal, the greater our general prosperity and welfare. Not the least amongst those who have remained away are the many who suffered in the Exhibition held at Porabazaar a year ago where the precautions against fire were insufficient to prevent a disastrous conflagration and consequent loss. The Calcutta Exhibition of 1923, has however, taken such precautions as to make the whole area practically fire-proof and the Fire Insurance Companies which have taken up the risk have been able to do so at a very low premium indeed.

Exhibits.

In spite of the abstentions from necessity or shortsightedness or confusion of ideas or fear the display in the Eden Gardens still remains a display worthy of Calcutta and Bengal and thoroughly representative of the enterprise of Indians and Europeans in the Presidency, and the lists of exhibitors and exhibits which are to be found in this Guide Book and the Catalogues are comprehensive and representative. The Exhibition is open to every article of trade or commerce or industry dealt in, in

India, whether imported from abroad or manufactured in the country. But special facilities are offered for the industries of the country and the greatest pains have been taken to produce a thoroughly representative display of the minor and cottage industries of Bengal. In the chapter devoted to these the details of the collections and the places of their origin are to be found. It is the hope of the organisers that these industries will derive great benefit from the wide advertisement they are now obtaining.

Bihar and Orissa.

The Bihar and Orissa Government have wisely decided on official participation in the Calcutta Exhibition and the Committee have given every encouragement to the neighbouring province whose exhibits will be found in a building by themselves in the centre of the grounds.

Other Exhibitions.

Exhibitions of this kind are of great advertising value. They are great stock-takings which multitudes are invited to look upon and they rarely fail to establish new connections, to open out trade where trade had not been before and to increase trade where trade already exists. The value of such Exhibitions is proved by the frequency with which they are held. Every modern civilised country has had its exhibitions and its great fairs and India has not been behindhand in this respect. The great war hindered the holding of exhibitions in most countries but the practice has been revived on the first opportunity and even Moscow has recently held a Commercial Exhibition. That Calcutta feels the desire for exhibitions is clear. Last year there was the exhibition in Porabazar in which a fire caused such extensive damage; and the year before we had

the Motor Exhibition, while in 1919 we had the Peace Celebration Exhibition. The melas and fairs so common throughout India testify to the Indian's love of a show of this nature. And, although it is true that many, if not most, people come to exhibitions for enjoyment, yet so good is the effect upon trade that exhibitors are often content to organise and run great displays at considerable immediate loss confident in an ultimate return.

The first great Exhibition held in Calcutta was the International Exhibition of 1883-84. There are many in Calcutta still who remember that display but there are many who have never heard of it and a brief account of it is appropriate on this occasion.

Calcutta International Exhibition.

The idea of holding the Calcutta International Exhibition of 1883-84 was originated by Mr. Jules Joubert, a gentleman of French extraction, naturalised in New South Wales, who visited Calcutta in 1882 and laid his plans before the Lieutenant-Governor. With the consent of the Government of India it was decided to hold the Exhibition under the management of the Government of Bengal. After the preliminary arrangements had been made Mr. Joubert left for Australia to canvass for support and adequate representation and the Government of India addressed all the Provinces and Administrations and the Feudatory Chiefs asking for support. A cordial response was the result in every case. The use of the Indian Museum was granted to Mr. Joubert and the Public Works Department were allowed to take up the construction of the buildings, which were first intended to be mere annexes of the Museum. Applications for space were so numerous,

however, that it was soon decided to take in part of the Maidan and ultimately the space covered by the Exhibition was 300,000 square feet. Even then the exhibits were crowded together and there was considerable inconvenience owing to lack of room. By the 4th of December, 1883, the buildings were complete, the exhibits installed, and the Exhibition ready to be opened in the presence of their Royal Highnesses the Duke and Duchess of Connaught by His Excellency the Viceroy. The total number of visitors to the Exhibition during the period for which it was open exceeded a million. The Exhibition was closed on the 10th March, His Excellency the Viceroy again performing the ceremony.

We may contrast the Exhibition of 1883-84 with the present Exhibition. The first great difference lies in the international character of the former compared to the purely Indian character of the latter. It is true that in the present Exhibition there are goods of foreign manufacture but these are goods dealt with by firms or businesses operating in India. No country outside India, not even the other parts of the Empire, have been asked to take courts or sections to display their wares, but the goods of every country which are used in India are here displayed in the hope that they may suggest to Indians the possibility of their production on Indian soil. Nor indeed is the Calcutta Exhibition even an Indian Exhibition in the widest sense, for it specialises in the commerce, trade, industries and arts of Bengal. To relieve this contrast and to compensate for the wider field from which the Exhibition of 1883-84 drew we have the great increase in commerce, trade and industry which India has wit-

nessed in the last 40 years. No part of India has seen a greater increase than Bengal and especially Calcutta. The photographs of the river in the sailing days and in recent times, which through the kindness of Mr. Stuart-Williams we are able to reproduce, are pictorial proofs of that great change, and statistical proofs will be found in the figures printed elsewhere.

Another contrast lies in the fact that in 1883-84 the Government of Bengal met the expenses of the Exhibition, although they had not at first intended to do so, while it is hoped that the Calcutta Exhibition of 1923 will pay its own way. Our predecessors of 40 years ago were fortunate in having the Museum buildings placed at their disposal and the services of the Public Works Department called in to their aid, while the organisers of 1923 were given only the site of the Eden Gardens without a single building standing on it, on condition that the expense of restoring the gardens should be borne by the Exhibition, and they were left to construct all their buildings themselves. The only assistance offered by the Government of Bengal is their good will, the use of the Gardens and a loan of Rs. 50,000.

A further contrast is to be found in the time for which the Exhibition lasts. In 1883-84 the Exhibition was open for nearly four months but the Exhibition of 1923 will close after one month. It is to be hoped that when it does close there will be still one more contrast to make in that the present Exhibition will have paid its way and left some money for distribution to the many charitable objects and associations now feeling the pinch of difficulty.

There were no commercial Exhibitions of note in Calcutta between the years 1883 and 1919, although Calcutta itself might well be said to have been one long exhibition of trade, prosperous on the whole. In 1919 the peace celebrations were organised on a grand scale and part of the celebrations was the Exhibition. That Exhibition resembled ours in that it was held in the Eden Gardens and confined to Indian trade, commerce, industry and art. It was open for less than a month and when the accounts were closed a surplus of Rs. 75,000/- remained for distribution to charities. The Exhibition of 1919 took advantage of certain methods of increasing profits which have not commended themselves to the organisers of the Exhibition of 1923 and there was much more money in Calcutta in 1919. These two facts greatly helped in paying its way. Nevertheless it is hoped that better business methods, especially in the way of advertising and publicity, combined with longer preparatory efforts and a longer period of working will compensate the present Exhibition for the advantages of 1919 and ensure a reasonable surplus this time too.

The Exhibition of 1919.

In 1921 the Motor trade of Calcutta decided on an exhibition, which as a display was a great success, though financially it involved its organisers in considerable loss. Being a specialised exhibition it was meant as an advertisement and it was not expected to pay "at the gate" but in the increasing trade in motors of all kinds which it was hoped to create. Even in the latter respect it was a disappointment, for, as everyone knows, the Motor trade is going through a period of great depression. It may be argued however that without the

The Motor Exhibition of 1921.

Exhibition the depression might have been greater. That it has been a very serious depression is evident from the complete absence of the Motor trade from the Eden Gardens now. The different houses, after very serious consideration, decided that they could not participate. We realise how great a gap this leaves in our display but we can only regret the cause and trust that the Motor trade has brighter prospects before it.

The Unfortunate Exhibition of 1922.

The last Exhibition in Calcutta was held a year ago at Pora Bazaar. It is too recent and too fresh in the public memory to need description here. A very serious fire almost completely destroyed it in its early stages and the effort to continue it, cannot be described as successful. The fate of this Exhibition has given a warning which has not been neglected. The present Exhibition is as fire-proof as precautions can make it and all the requirements of the Fire Insurance Association have been fulfilled.

The United Provinces Exhibition of 1910-11.

The United Provinces Exhibition held at Allahabad in 1910-11 was another successful organisation and there was also a successful exhibition at Nagpur in 1908 and one in Madras in 1903. The advance that has been made since the United Provinces Exhibition is well exemplified by the fact that among the greatest attractions then shown in Allahabad were two aeroplanes. Searching for information about these in the Official Hand-book one finds it in the chapter on "Amusements"! To-day aeroplane mail and passenger lines are running between various places throughout the world; we are on the eve of a flight round the world if the signs read correctly; and a great air service has been planned to begin very soon and connect India to the heart of the Empire in London

by another bond. The "amusement" of a dozen years ago has developed into a great commercial factor and by means of it, India will be but four days from England. This rapid development is itself a proof of the advantage and necessity of frequent exhibitions, for the progress of science is so rapid now that a novelty becomes out of date in a decade. Nothing but advantage can accrue to India and the Empire from the development of science and especially of scientific communication. It would be no novelty or 'amusement' now to show aeroplanes in India. Who can tell?—one day there may be an aeroplane and airship industry in India too.

Some of the photographs of Calcutta exhibited by the Calcutta Improvement Trust have been specially taken for the Exhibition from aeroplanes.

Congress Exhibitions.

Under the auspices of the Congress there have from time to time been exhibitions held in India and this suggests a political significance also in these displays. Perhaps no exhibition in the result will have more political significance than the great British Empire Exhibition of 1924, which first suggested the idea of the Calcutta Exhibition of 1923. Indeed, already there has been a danger of too much political importance being attached to it, but in the retrospect those who proposed to boycott it on account of the Kenya decision may bless it as having helped to solve that problem which has caused so much resentment in Indian circles.

We have by no means exhausted the list of exhibitions held in India and we have made no mention of the great exhibitions held abroad, in Chicago, Paris, London and innumerable other places. We do not compare our modest enterprise with these but the facts

that they have been so numerous and in so many diverse countries and that exhibitions still continue to be held almost every year, emphasise the world-wide importance attached to such organisations, and it is this importance that is our chief justification for the Calcutta Exhibition of 1923.

CHAPTER II.

THE SITE OF THE EXHIBITION— THE EDEN GARDENS.

A special sub-committee appointed by the Executive Committee to choose a site for the Exhibition decided on the Eden Gardens with an overflow into the High Court Maidan. Several other sites were examined but the choice fell upon the Eden Gardens on account of their beauty, their convenient situation, the facility with which they lend themselves to the organisation of an exhibition and their previous association with at least one successful exhibition, that of 1919. There is no need to dwell upon the beauty of the Gardens. Every citizen of Calcutta has revelled in it and our visitors can behold it for themselves. The history of the Gardens, however, is not so well-known. We are able to publish facts about them which have not been published before, facts which will be new to all.

Search will be made in vain for what we call "The Eden Gardens" in pictures and sketches of old Calcutta. In all the great transformations that have taken place in the cheerless swamp and jungle which greeted the gaze of old Job Charnock, no transformation has been more complete than that of the portion of the riverside running from Prinsep's Ghat to the building which is now the head-quarters of the Imperial Bank of India.

In a view of "The Supreme Court" which forms part of the 12 views of Calcutta published by Thomas Daniell in 1786-88 and in a "View taken on the

Esplanade, Calcutta" in 1792 and published in the second series of Daniell's "Oriental Scenery" there is not a vestige of a tree to be seen in front of the present High Court building which stands on the site of the old Supreme Court. As late as the time of Sir Charles D'Oyly, whose "Views of Calcutta and its Environs", though published in London in 1849, were drawn before 1838, the same characteristic of the landscape may be noticed. The present Strand Road, however, had already been begun in 1821 and it represents one of the undertakings successfully carried through by the Lottery Committee. It was formerly a low sedgy bank and the shallow water which was alongside has now shifted to the west owing to the formation of the Sumatra sand by the sinking of a ship of that name opposite Prinsep's Ghat. Before the reclamation, which has thrown a considerable part of the river bank into the roadway, this Ghat and also the water Ghat were actually landing stages, as their name implies, and stood flush with the water.

The colonnade of the Grecian Doric order which goes by the name of Baboo Ghat and may be found facing the Eden Gardens, a little to the south of the High Court, dates, as the inscription upon it testifies, from 1838. We get a reference to it in a "Diary of Travels in Upper India" by Colonel C. S. Davidson of the Bengal Engineers (Vol. II. page 209 : London, 1845) : "1840. A Grecian Ghat has been built at the north end of the old Respondentia Walk". The position of this walk was once indicated by a row of fine trees which stood south of Baboo Ghat but most of these were destroyed in the cyclone of 1864. It filled up the intervening space between the Fort and the old Chändpal



THE SITE OF EDEN GARDENS IN 1792.
Lent by the Calcutta Historical Society.

Ghat, now removed to make way for an embankment and the Port Commissioners' Railway, but famous in history as the spot where India welcomed and bade farewell to her rulers. The name "Respondentia" is derived from an old trade technicality which is thus explained: "Money borrowed, not upon a vessel as in bottomry, but upon the goods and merchandise contained in it which must necessarily be sold or exchanged in the course of the voyage, in which case the borrower is bound personally to answer the contract". Yule and Burnell (Hobson Jobson) quote from a manuscript letter of James Renall, of February 20, 1776, in which he says "I have desired my Calcutta attorney to insure some money lent on Respondentia on ships in India". No doubt this walk by the river served as a sort of change where such bargains were made. But it also furnished the pretext for many a moonlight assignation and ramble. Its construction dates also from the time of the Lottery Committee, which under the authority of Government looked after municipal matters from 1817 to 1836 and financed its operations from the balance of 4½ lakhs of rupees obtained from the seventeen lotteries organised by their predecessors, the Lottery Commissioners.

It is during the Governor-Generalship of Lord Auckland (1836-42) that the Gardens as such first make their appearance. They were originally known as The Auckland Circus Gardens and were referred to under this designation all along from 1842 to 1856, except in one singular instance in April 1854 when mention of the name "Eden Gardens" appears in a letter from the Secretary to the Government of Bengal addressed to the Chief Magistrate. The searches made in the records of the Imperial and Bengal Government for the pur-

poses of this chapter have not revealed the time and circumstances under which the name "Auckland Circus Gardens" was eventually changed to "Eden Gardens", but it may be inferred that the latter name was formally substituted for the former sometime between 1854 and 1862 when the question of the improvement and enlargement of the gardens was being considered. But whether this substitution was made in compliment to the Misses Edens, the sisters of His Excellency the Governor-General, or to the Governor-General himself, whose family name was Eden, still remains in doubt.

It appears from the Bengal Government records that the "formation of a Circus and Gardens" was authorised by His Excellency the Governor-General in 1840 and that "his only object was to enlarge the convenience of the public by the construction of a pleasure ground on a site generally resorted to for riding and recreation".

It was bounded on the south west by Respondentia Walk; on the east by the Calcutta Gate Road and on the north by Esplanade Row, as will appear from the map of Calcutta and its environs by J. B. Tassin, 1834. The site of the "Effigy by Weekes of George Eden, Second Baron and first and only Earl of Auckland" on the north of the lake was not at first part of the Garden but was allotted by the Governor-General-in-Council in 1844 to the Auckland Testimonial Committee for the erection of the statue. The statue was erected there in 1849 but it was again removed and is now to be found opposite the north gate outside the gardens.

It was in 1856 that the Pagoda was set up in the Gardens in which it has since continued to be a principal object of interest. This Pagoda has a history all its

own. It was built in Prome in the year 1852 (Burmese Era 1213-14) by Ma Kin, wife of Moung Honòn, Governor of Prome, Shoay-Goung and Tarophmaw, who was commonly known among the Burmese as the "Shoay-Doung-Woon". This was the official appointed by the Court of Ava as Woon of Hanthawaddy just before the outbreak of the Burmese War. Ma Kin, the "Woon Kaddaw" or Governess, resided at the time (1852) at Prome, where her authority was respected in the absence of her husband at Ava. She was then 40 years of age, two years older than her husband. She was daughter of Moung Shoay Loo, the Paynin of Toung Law Nyo, by his wife Ma-Woon.

The Pagoda was constructed by Moung Huyne and ten others (carpenters) who completed it in about three months' time. The wood work of the Pagoda cost about 14 or 15 viss of silver, *i.e.*, Rs. 1,400 or 1,500. Within the Pagoda however was an image of Gandama with its forehead set with precious stones and this image cost a further sum of one thousand rupees (ten viss of silver). The Pagoda is of that class of buildings called "Tazoungs or Thein Tazoungs" used by Buddhist priests for worship but also, and perhaps chiefly, by Puzins or Neophytes on the occasion of their consecration to the monastic life.

It was Lord Dalhousie, who, on his visit to Prome in 1853, decided on the removal of the Tazoung to be re-erected in Calcutta and it was dismantled by his order and placed aboard the Hon'ble Company's ship *Shnay Gong* and landed in Calcutta on the 29th September, 1854, where it was handed over to the charge of Lieutenant Blair of the Madras Artillery. As so often happens even yet in Calcutta there was a difference of opinion

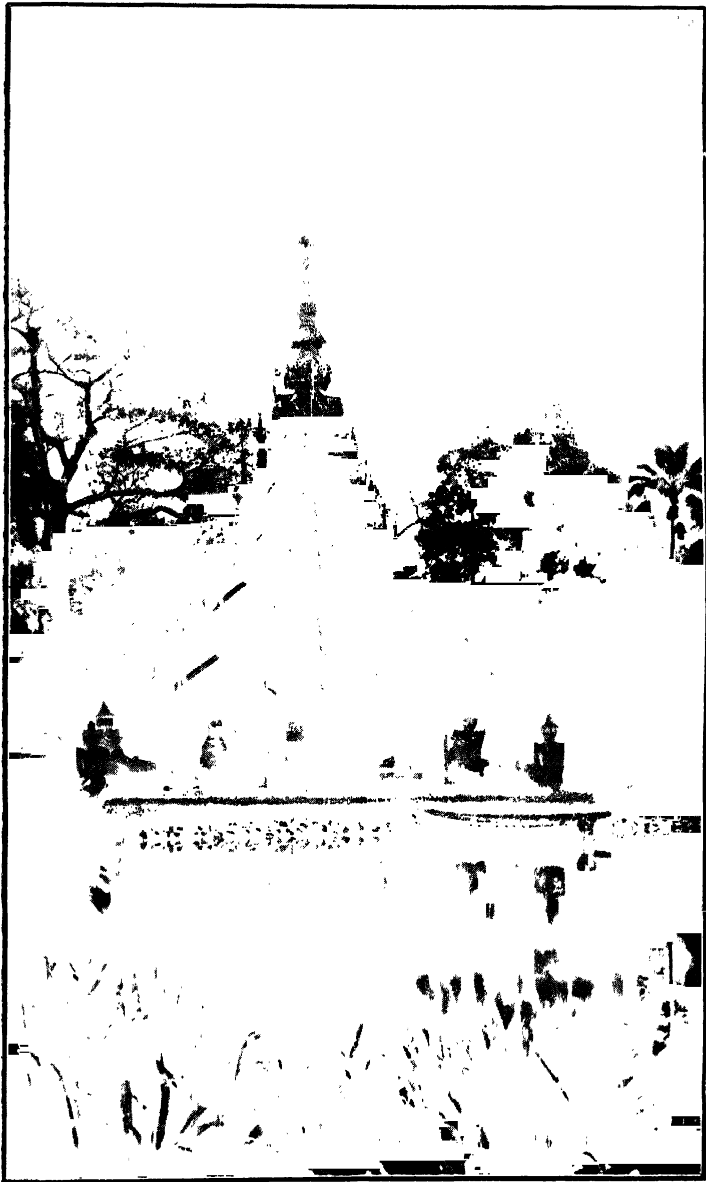
about the most suitable site on which to re-erect the building. The Governor-General-in-Council, therefore, determined to postpone its re-erection and Lieutenant Blair received instructions to store the parts carefully in the Arsenal of Fort William under his own direct supervision in the meantime. On the eve of his departure on the 22nd February, 1856, Lord Dalhousie wrote in a minute "Before I go I would propose to ask the Lieutenant-Governor whether there is now any objection to the erection of the buildings *in the Auckland Gardens.* If it should be resolved to set it up, workmen for the purpose had better be got, indeed they must be got, from Rangoon; as well as some one to superintend the work. Communication with the Court Major, Phagu, will readily procure all that is required".

The Lieutenant-Governor in Council having no objection to the ornamental building being erected *in the Auckland Gardens* it was subsequently set up by a dozen Burmese artificers under the direct supervision and guidance of Lieutenant Blair, and they took three months to complete the work.

The fitting up of the Pagoda cost Rs. 6,000/-. It bears the following inscription :—

> "The above specimen of the Burmese ornamental architecture was removed from the city of Prome in the months of August and September, 1854, and re-constructed on this site in the months of October, November and December, 1856".

In 1854 the Gardens were transferred from the charge of the town Major and Civil Architect by orders of the Governor of Fort William to the charge of the



THE PAGODA, EDEN, GARDENS.

Chief Magistrate and Commissioner of Police, Calcutta. The trees and shrubs and flowers of the Gardens are all in the care of the Royal Botanic Garden authorities.

There was an old Bandstand inside the Gardens where the Town Band or Band of the European Regiment stationed at Fort William played every evening. The Gardens were therefore for the most part resorted to only in the evenings and it would appear that it was the music that was the chief attraction. The Reverend W. K. Firminger in his "Guide to Calcutta" says "The evening walk in the Eden Gardens was sacred to the Calcutta *élite* and, if not in uniform, one had to assume a top hat and frock coat in order to mingle there with the great ones of the land. Then came a wave of liberal sentiment, and the pleasure of listening to the Military Band discoursing sweet music ceased to be a monopoly for Europeans". The people in carriages had little chance of hearing the bands and those on horseback were kept apart from the band by the space reserved for those walking. To remove all these disadvantages Sir C. Beadon, the Lieutenant-Governor of Bengal suggested some improvements which it was desirable to make in the Gardens "with every regard to taste and public convenience". And subsequently in 1865 a detailed scheme for the improvement and enlargement of the Gardens was submitted by Captain S. T. Trevor, R. E., Garrison Engineer, which was approved of by the Government of India. The work was completed during the years 1865-71.

The Gardens were considerably extended eastward beyond the Calcutta Cricket Club ground by the removal of the old road, which, running from the High Court to

the Calcutta Gate of the Fort, then formed the western boundary of the present site of the Cricket Ground, which was thus constituted a portion of the new Eden Gardens without in any way suffering as a Cricket Ground.

The Calcutta Cricket Club had been occupying since 1825 a plot of land through which the existing road leading to the Plassey Gate of the Fort runs; but at the time of the construction of the Plassey Gate Road the members of the Calcutta Cricket Club objected and memorialised both the Lieutenant-Governor and the Governor-General of India praying that the line of the road might be deflected a little to the east so that their ground might be saved. The memorials were rejected and consequently they had to move their ground further westward by the side of another road, which then ran from the High Court to the Calcutta Gate of the Fort. Subsequently, as has been pointed out, under the scheme of the enlargement and improvement of the Eden Gardens by Captain Trevor the Cricket Ground was constituted a portion of the Gardens. In 1871 the Governor-General in Council sanctioned the construction of a pavilion in place of the very unsightly thatched hut propped up with bamboos under the following conditions:—

(1) That the materials are of wood or corrugated iron which can at any time be swept away, and that no walls of any other materials are erected, and (2) that the Cricket Club will at any time, on being required to do so, promptly remove the erection without compensation.

These conditions were in accordance with the repeated decisions of Government that no structure with

any pretensions to permanency can be permitted on the Esplande of the Fort.

A broad turfed ride for equestrians was made after the scheme of Captain Trevor, its course being diverted to the north of the Gardens so as to pass immediately to the north of the Pagoda block and thence in a north easterly direction round the Cricket Ground up to the Band stand, the triangular space enclosed between the ride, the Strand and the Auckland Road being reserved for the gardens.

CHAPTER III.

THE LAY-OUT OF THE EXHIBITION.

Before proceeding to give the detailed description of the various sections and the stalls they contain, it may be well to take a general view of the Exhibition and its lay-out. We enter by the main gate—a striking design by Mr. S. G. Ghanekar who won the prize offered by the Exhibition Committee. There were numerous entrants for the competition and many of the designs submitted showed great merit. The winning design has been slightly altered in its erection, which has been supervised by Mr. Trout of Messrs. Martin & Co., with the kind permission of that firm. Passing through the turnstile we find ourselves in the Engineering Section on the part of the High Court maidan which has been enclosed. The buildings here have all been designed by the exhibitors themselves but most of the construction has been by Messrs. Warren & Co., the Exhibition Contractors. Crossing to the Auckland Road we pass the Calcutta Research Tannery, a Government exhibit in which several processes of tanning may be seen. Proceeding along the main road through the section we pass the large stalls of Messrs. Jessop & Co., John King & Co., Martin & Co. on the right and Messrs. Kumardhubi Engineering Co., Henley & Co. and Avery on the left. This brings us to Auckland Road where bearing to the left as we cross we enter the Eden Gardens proper and find ourselves on the Grass Ride in the Raw Products

Section. It will be noticed that a line of standards to carry the electric current cable has been erected along the centre of the drive.

We now turn to the right and follow the Grass Ride walking in a south westerly direction and we first pass through a Miscellaneous Section. Here we notice two stalls of the Co-operative Department, another Government exhibit, and as we pass the Army and Navy stall we reach the section allotted to the Industrial Schools, whose exhibits are displayed on both sides of the ride. Proceeding we approach the Electric Transformer Station on our right where the whole supply of current for light and power is brought into the Gardens at a voltage of 6,000 and transformed for use to the standard voltages of 220 and 440. This station is itself an exhibit and the public are freely admitted. Passing the Electric Station we cross the road leading from an entrance gate on the Auckland Road, which is the gate for the tram terminus opposite the High Court, and we again find ourselves among exhibits of Raw Products. As we stand here looking south west there is a large section (Section A on the plan) on our right beyond the stalls that line the Ride. This is the Food Products Section lying between the Ride and Auckland Road outside. In this large triangle will be found the Exhibit of the Department of Agriculture, Firpo's Refreshment Rooms, the Palais de Danse with its spacious floor, the Band Stand etc. But we shall not digress from the Grass Ride to enter this section now. Instead we proceed down the Ride noticing among others the Cawnpore Exhibits and those of the Jute Mills Association and the Dunbar Mills, beyond whose buildings we enter the Cottage Industries Section where

we find 34 stalls from all the different districts of Bengal lining both sides of the Ride.

We now find ourselves at the western end of the Ride and here there is another entrance gate on the Strand Road. Turning to the left we are in a wide open space devoted to Amusements. The Helter Skelter in the centre catches the eye and the American Circus and various side shows invite us but we pass on to the Stadium where we also see in a prominent position Peliti's Restaurant. At this point on our right there is another gate giving entrance from the Strand Road and outside on the Strand Road accommodation is provided to park some hundreds of motor cars. We walk past the Stadium and Peliti's and enter the Grass Ride again at its southern extremity. Here we see some stalls exhibiting various types of cookers, *e.g.*, the Ic-Mic, the Julius Stove &c. They are placed here so that in case of fire during demonstrations the fire cannot spread. As we turn to the left and proceed in a north-easterly direction we soon come to the Indian Theatre on the right. Keeping to the Ride we pass through the sweetmeat stalls. Our walk takes us into the Horticultural Section next and it is here that the flower shows will be held. Nearby there is a break in the line of stalls on the right and we can see amongst the trees some yards away the exhibit of the Tea Cess Committee, where tea can be purchased at two pice a cup. From here a full view of the Cricket Ground is obtained and we then approach a collection of miscellaneous stalls. We also meet the Hindu and Mahommedan Restaurants here, and a general restaurant somewhat withdrawn off the Ride, each provided with large accommodation and quite separate from each

other and from the surrounding buildings. Passing through a further collection of stalls showing toys, umbrellas, locks, stationery, and other miscellaneous products we approach the Chemical Section, which is well worth detailed examination. From this we pass to a collection of stalls in which jewellery and miscellaneous goods again predominate and we find ourselves once more at the point where we entered the Eden Gardens. We go on until we reach the road leading from the Auckland Road entrance gate, to which we have before drawn attention, and turning sharp to the left we follow this road and cross the first bridge. Here we see before us an oval building, the Indian Ladies' Pavilion. The design is Indian and the archways in particular attract attention. This design is due to Mr. Tagore. The exhibits in this oval will well repay a careful study but we must pass on now to the European Ladies' Buildings meeting the Red Cross and St. John's Ambulance exhibits as we proceed and noting the Girl Guides' display. The European Ladies' Building abuts on the lake over which a verandah of the building hangs. Seen from the other side of the lake the reflection of this building in the water presents a very striking effect. Even here we must not delay now and our road takes us over another bridge where a long building all by itself bars our progress. This is the European Girls' School exhibit. The wonderful lace and other work shown here is sure to arouse great interest.

Past the Girls' School exhibit we come to the Bihar and Orissa Building, essentially simple in design and execution but containing a comprehensive collection of the products of the province. From this we pass

on to another isolated building belonging to Messrs. Keventer & Co., where the process of mechanical milking is daily demonstrated. Almost immediately we find ourselves in the Amusements Section again but we turn to the right and cross the main bridge which leads us to the Pagoda and thence to the Post Office and the building that contains the Fine Arts and Historical Exhibits. Here too is the Exhibition Office.

In this rapid survey we have noted only some of the more striking features of the Exhibition and we have omitted to mention many details worthy of notice. In the subsequent chapters detailed descriptions of the the various sections will be found and detailed mention of exhibitors. We have indicated, however, the best itinerary to furnish a general idea of the lay-out of the Exhibition which was the object of the chapter.

DO NOT MISS THE SHOWS IN THE STADIUM AND THE INDIAN THEATRE.

SEE THE DAILY PROGRAMMES.

CHAPTER IV.

FIRE PRECAUTIONS BY THE CALCUTTA FIRE BRIGADE.

The Calcutta Fire Brigade protects an area of slightly over 113 square miles which includes the Municipalities of Calcutta, Cossipore-Chitpore, Howrah, Manicktolla and Garden Reach.

Fires in the above Municipalities are attended free of charge, and fires are attended on payment, according to rates laid down by Government, within a radius of six miles from the Fire Brigade Headquarters and not within the Municipalities.

The upkeep of the Fire Brigade is derived from a tax imposed on Licensed Warehouses (under the Licensed Warehouse and Fire Brigade Act) and from Municipal rates and taxes.

The Staff of the Fire Brigade numbers 23 European Officers and Men and 194 Indian Officers and Men.

The appliances in commission comprise 14 Motor Fire Engines fitted with pumps, ladders, hose and all necessary accessories. Motor Turntable ladder, extending to 90 ft., various tenders, Steam fire engines &c, distributed throughout the various Stations of the Brigades.

The average power of a Motor Fire Engine is about 60 H.P. and it pumps about 500 gallons a minute at efficient fire fighting pressure.

About 40,000 feet of canvas fire hose are employed.

The average number of fires for the past five years has been about 610 per annum.

There is an efficient system of street fire alarms provided numbering about 160 points.

On receipt of a call the average time for turning out Machine varies from 15 seconds to 40 seconds and at least four or more fire engines can be mobilised at any danger zone within a very few minutes.

For the protection of the Calcutta Exhibition the Calcutta Fire Brigade is maintaining a fire station in the Exhibition Grounds which will be open to visitors and will contain many very interesting exhibits. A Motor Fire Engine fully equipped and capable of pumping 500 gallons a minute will be on duty, and also about twelve firemen.

Numerous small Chemical Extincteurs will be placed throughout the ground under the care of the Fire Brigade for the purpose of dealing with any fires in their incipient stages. The majority of these Extincteurs have been kindly lent by firms in Calcutta and instruction in the use of any particular type will be given on application at the Exhibition Fire Station.

Four electrical fire alarms are provided in the Exhibition for the purpose of warning the Exhibition Fire Station of any fires which may occur, and this Station is in direct communication with the Fire Brigade Headquarters, so that should the appliance provided at the Exhibition not be capable of completely dealing with an outbreak three more Fire Engines can be relied upon to be present in about three to four minutes.

Considerable attention has been devoted to arranging the Exhibition in such a manner as to make a

serious fire practically impossible, adequate spaces and fire stops being provided and all decorations &c. being rendered fire resisting.

It may be noted that visitors are always welcomed at any of the Calcutta Fire Brigade Stations by appointment.

Such visits are very interesting and some of the most up-to-date and efficient fire fighting machinery in the world may be seen.

CHAPTER V.

CALCUTTA EXHIBITION GUIDE BOOK.

RAW PRODUCTS AND TEXTILES SECTION.

Name and address of Exhibitors.	Stall No.	Nature of Exhibits.
1. The Titaghur Paper Mills Ltd., Managing Agents, F. W. Heilgers & Co., Chartered Bank Buildings.	Bird & Co's Stall 135 &c.	Paper.
2. Bengal Paper Mills Ltd., Managing Agents, Balmer Lawrie & Co., 103, Clive Street, Calcutta.	101 & 102	Paper.
3. Bengal Flour Mills, Empire Flour Mills, Managing Agents, Balmer Lawrie & Co.		Flour.

	Name and address of Exhibitors.	Stall No.	Nature of Exhibits.
4.	Bird & Co., Chartered Bank Buildings, Calcutta.	135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155 & 157	Coal, coke and bye-products.
5.	F. W. Heilgers & Co., Managing Agents, Bird & Co.		Do.
6.	The Indian Tanneries Ltd., Managing Agents, Bird & Co.		Leather & leather Goods.
7.	The Indian Leather Manufacturing Co., Ltd., Managing Agents, Bird & Co.		Do.
8.	North West Tannery Co., Cawnpore.	126 & 128	Do.
9.	R. J. Gazadar & Co., 1, Pollock Street, Calcutta.	94	Do.
10.	Hasan Ali Chowdhury, 2/4, Chandney Chawk, Calcutta.	87	Do.
11.	Chaganlal & Co., P.O. Box 3089, Bombay.	96	Artificial imitation leather.

12.	Plummer Bros., 7, Hare Street, Calcutta.	95	Imitation leather & oil cloth.
13.	The Eastern Lubricants Ltd., Managing Agents, F. W. Heilgers Ltd.	Bird & Co's Stall 135 &c.	Lubricating oils and grease paints.
14.	Shalimar Paint Colour & Varnish Co., Ltd., Managing Agents, Turner Morrison & Co., Ltd., Lyons Range, Calcutta.	121-123	Paint colour varnish pitch & tar.
15.	A. J. Shellim & Co., F-4, Clive Buildings, Calcutta.	118, 120, 122 & 124	Paints and varnish.
16.	The Gourepore Co., Ltd., Managing Agents, Berry & Co., Calcutta.	99	Linseed oil.
17.	Angelo Bros., Ltd., Managing Agents, Turner Morrison & Co., Ltd., Calcutta.	125	Shellac.
18.	Cossipore Sugar Factory Ltd., Managing Agents, Turner Morrison & Co. Calcutta.	117 & 119	Sugar and Sugar products.

	Name and address of Exhibitors.	Stall No.	Nature of Exhibits.
19.	C. V. Naidu, Malanga Lane, Calcutta.	131	Tobacco.
20.	American Eastern Tobacco Corporation, 37, Canning Street, Calcutta.	10 & 12	Tobacco, cigarette and cigarette-making machine (running).
21.	Moolji Sheokh & Co., 51, Canning Street, Calcutta.	14	Tobacco, Biries and necessary things for their manufacture.
22.	Brushware & Co., Cawnpore.	130	Brushes.
23.	Bonner & Co., 209, Cornwallis Street, Calcutta.	134	Do.
24.	The Assam Saw Mills Co., Managing Agents, Bird & Co.	Bird & Co's Stall 135 &c.	Tea boxes, rubber boxes, veneer wood.
25.	Sylhet Lime Company, Managing Agents, Messrs. Kilburn & Co., 25, Swallow Lane, Calcutta.	129	Lime.
26.	Jallo Resin Factory,	89	Resin, Rosin, turpentine, rosin oil, photograph materials and empty containers,

27.	Dunbar Mills, Managing Agents, Messrs. Kettlewell Bullen & Co., P.O. Box No. 121, Calcutta.	112, 114 & 116	Cotton Manufactures.
28.	Indian Jute Mills Association, Royal Exchange, Calcutta.	65, 67, 69, 71 & 73	Jute Mill manufactures and exhibits connected therewith.
29.	Bengal Luxmi Cotton Mills, 28, Pollock Street, Calcutta.	136, 138, 140, 142, 144, 146, 148 & 150	Textiles, dressing materials, bandages and disinfectants.
30.	Elgin Mills Ltd., Managing Agents, Samuel Fitze & Co., 4, Government Place, Calcutta.	132	Cotton and woollen manufactures.
31.	Muir Mills Co., Ltd., 25, Chowringhee Road, Calcutta.	68 & 70	Tents, durries, &c.
32.	Cawnpore Woollen Mills & Co., Cawnpore.	82, 84, 86, 88, 90 & 92	Textiles.
33.	Foyzdar Bros., Ltd., 9, Sandhurst Road, Bombay.	11 & 13	Woollen yarns, worsted cloth, rugs, blankets, etc.
34.	Kaiserhind Woollen Cotton & Silk Mills, Bangalore.	78 & 80	Woollen blankets & rugs.

	Name and address of Exhibitors.	Stall No.	Nature of Exhibits.
35.	The Ahmedabad Manufacturing & Calico Printing Co., Ltd., and the Ahmedabad Jubilee Spinning Co., Ltd., Ahmedabad.	85	Cotton, sewing thread & cotton ropes.
36.	Mohini Mills, Kustea.	9	Cotton cloths, &c.
37.	Inspector General of Prisons, Bengal.	79 & 81	Jail products.
38.	Singh Singh & Co., Cashmere.	76	Cashmere embroideries & Industrial products.
39.	Ralli Bros., Calcutta.	101	Seeds.
40.	Swaraj Factory.	74	Trunks, cash boxes.
41.	Shalimar Rope Works, Managing Agents, Turner Morrison & Co.	127	Ropes.
42.	Mr. Rundlett, 24, Ripon Street, Calcutta.	133	Articles by Anglo-Indian unemployed.

Stall Nos. 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155 & 157.

MESSRS. BIRD & CO., CHARTERED BANK BUILDINGS, CALCUTTA.

Coal Department.—Messrs. Bird & Co., Managing Agents of one of the oldest and biggest Coal Companies in India, The Burrakur Coal Co., Ltd., exhibit samples of the following well-known coals :—

Saltore "Desherghar."—This is mined at that up-to-date Saltore Colliery whose entire output has from its inception been taken by the Indian State Railways.

This is one of the best coals ever discovered in India.

Jherria Coal.—Samples of 1st Class Jherria Steam Coal comprising 12 Seam Katras Colliery, 13 Seam Mudidih Colliery, 14 Seam Teetulmuri Colliery and 15 Seam Loyabad Colliery. The Seams are mined at the above and other collieries of the Burrakur Coal Co., Ltd., in the Jherria Field from range from 10 Seam to 16 Seam. Practically the entire output of the Seams exhibited is being supplied to the principal consumers in India.

Coal Dust from the Seams exhibited is supplied to the Loyabad Coking and Bye-Products Plant, the production of which namely Hard Coke, Desherghar Rammed Soft Coke, Coal Tar and Sulphate of Ammonia, of which samples are also exhibited, is well-known throughout India, Burma and Ceylon.

The Titaghur Paper Mills Company, Limited, (Managing Agents, Messrs. F. W. Heilgers & Co.,

Chartered Bank Buildings, Calcutta,) exhibit specimens of the indigenous raw materials in various stages for paper-making, together with samples of the finished product.

An interesting item is the model paper-making machine used in the Mills for experimental work which serves to illustrate the process of manufacture.

Nagpur Clay Co. Ltd., (Messrs. F. W. Heilgers & Co., Managing Agents.) This exhibit represents Indian Clays and Ochres found in Behar and Orissa. The former are principally used in the manufacture of pottery, paper and soap, the latter in distempers.

The Clay is free from grit and is of great value in the manufacture of cotton goods for sizing purposes.

MESSRS. F. W. HEILGERS & CO.

Coal Department.—The Coal samples on exhibit comprise Messrs. F. W. Heilgers & Co.'s famous " Heilgers Standard " quality which is drawn from their well-known Mines in the Jherria Coal field. " Heilgers Standard " Coal has for many years been used for foundry Coke making by steel works and a Mail and fast Passenger services. It is also extensively used for foundry Coke making by steel works and a sample of the Coke manufactured is displayed.

" Heilgers Standard " Coal has a reputation second to none for bunkering purposes and is known by all Steamship owners who trade in the East.

Messrs. F. W. Heilgers & Co., maintain their own Coaling Depots at Calcutta, Rangoon, Madras and

have Agents at Colombo, Penang and Singapore for the supply of "Heilgers Standard" Coal.

Rates for "Heilgers Standard" Bunker Coal may be obtained from their Head Office at Chartered Bank Buildings, Calcutta or from their undernoted Agents :—

Rangoon	Messrs.	F. W. Heilgers & Co.
Madras	,,	The South Indian Export Co., Ld.
Colombo	,,	Delmege Forsyth & Co.
Singapore / Penang	,,	Boustead & Co., Ld.
London	,,	F. W. Heilgers & Co. 7, Gracechurch Street.

Messrs. F. W. Heilgers & Co., on application will be pleased to quote rates for their "Heilgers Standard" Coal C. I. F. any Port or F. O. B. Calcutta.

Messrs. F. W. Heilgers & Co., on application, sample of their Patmohna Coal which is drawn from one of their new Mines in the Raneegunge field. This Coal has been certified by one of the large Railways as suitable for Mail and Passenger service. It is of the same type and quality as the famous "Deshergarh" Coal.

The Undernoted Coal Companies are under the Managing Agency of Messrs. F. W. Heilgers & Co. :—

Standard Coal Co., Ld.
Borrea Coal Co., Ld.
Bhulanbararee Coal Co., Ld.
Sendra Coal Co., Ld.
Govindpore Coal Co., Ld.

Khas Jherria Colliery Co., Ld.
Patmohna Collieries, Ld.
Neetooria Collieries, Ld.
Churulia Coal Co., Ld.
Ondal Coal Co., Ld.

Indian Patent Stone Co., Ld., (Bird & Co., Managing Agents.) Indian Patent Stone is a special composition for making permanent and artistic floors, and is usually laid in Grey, Red or Mosaic.

It is prepared to withstand the hardest wear, outlasting the remainder of the structure and improves with age. It is also damp proof and requires no recurring expenditure or maintenance, and only needs washing to keep it clean.

Indian Patent Stone is particularly adaptable to the extremes of the Indian climate, and has been laid for pavements, mills, tea gardens, factories as well as for residences and offices all over India. It has withstood the test of over 30 years, and is still one of the best flooring materials in India.

All information can be obtained from Messrs. Bird & Co., Calcutta, where samples of Indian Patent Stone flooring can always be seen.

Assam Saw Mills & Timber Co., Ld., (Bird & Co., Managing Agents.) Messrs. Bird & Co., were the pioneers of the ply wood industry in India. A large 3-ply tea box factory has been erected in the heart of the Tea District of Assam, and a box, as exhibited, is

now being manufactured equal in quality to any imported tea chest. Besides this Veneer Factory the Company has other Mills capable of turning out a large number of ½ in. country shook tea boxes, these boxes have been supplied to the leading Tea Companies in Assam for a number of years, giving entire satisfaction.

For further particulars see leaflet at the Stall.

Chota Nagpur Mica Syndicate, Ld., (Bird & Co., Managing Agents.) This mineral is obtained from our Mines at Kodarma, in the Hazaribagh District. It is used extensively for insulating purposes in all electric appliances.

The exhibit consists of sheets of Mica of various sizes, and qualities. Mica prepared in the form of Splittings from which Micanite is manufactured.

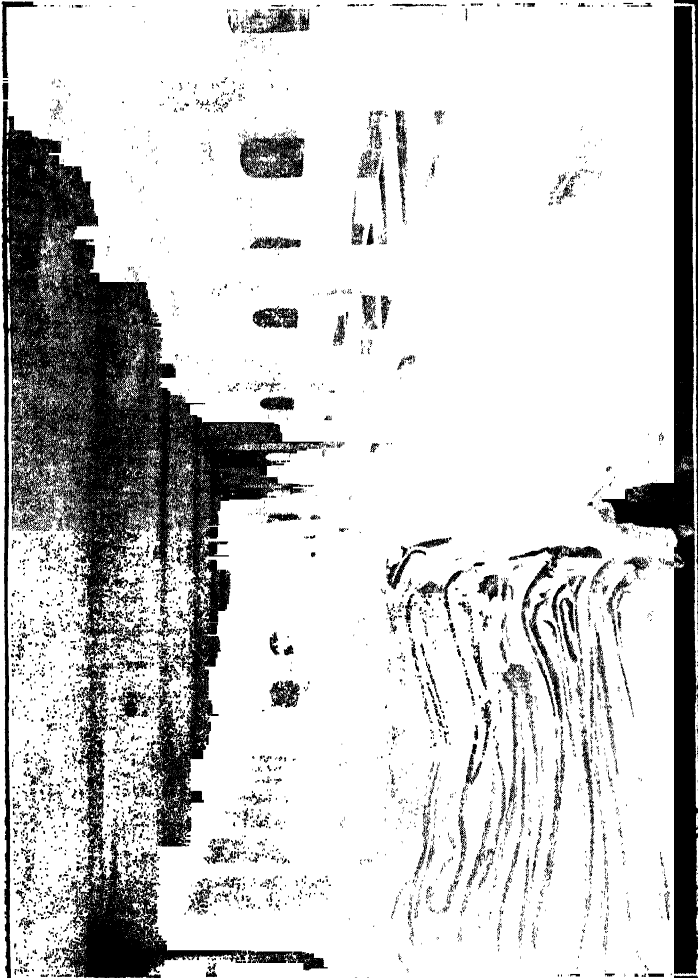
Powdered Mica and Flaked Mica, the latter being used as a lagging for Boilers and Steam pipes, the power of resistance to heat being exceptional.

Photographs showing the preparation of Mica in its various forms are included.

Bisra Stone Lime Co., Ld., (Bird & Co., Managing Agents.) The Bisra Stone Lime Company Limited owns extensive deposits of some of the finest Lime Stone in the country, and these are situated in the Gangpur Feudatory State (Chota Nagpur) not quite 300 miles from Calcutta.

Modern Kilns have been erected at Birmitrapur

station, B. N. Ry., at considerable cost and several labour-saving devices have been installed with a view to obtaining a large output of Quick and Slaked Lime daily to meet the demands of Builders on this side of India.



Bird & Co.'s Tannery.

The Lime Stone itself is very largely used as a flux in Iron and Steel Works and to cope with the demand for this purpose the Company is making arrangements for the extraction and despatch of over a thousand tons of stone daily.

The Eastern Lubricants, Limited, (Managing Agents, F. W. Heilgers & Co.,) Chartered Bank Buildings, Calcutta. Importers of high grade Mineral Lubricating Oils and Greases from the United Kingdom, U. S. A. and Russia.

These Oils and Greases are sold under the Managing Agency of Messrs. F. W. Heilgers & Co., Chartered Bank Buildings, Calcutta.

Purity, Cleanliness, Durability, Economy, Increased Power and the lowest co-efficient of friction are the essential parts of L. O. I. C. Lubricating Oils. They are manufactured according to the latest and most improved methods, are absolutely free from acids gummy or tarry matters, and will always give satisfaction.

A trained staff is maintained by the Company who are prepared to give prospective clients the full benefit of their experience as to the best oil to use, provided the particulars of the machinery, etc., are given.

Samples, prices and full information will be furnished on application to Stall No. 130, or better still, at their Head Office, and if desired, the Company will send a Representative to actually study lubricating problems on the spot.

These Oils and Greases have been, and are still being supplied to the Government of India and many

of the largest Corporations and Firms all over the country.

Stocks are carried in Calcutta, Bombay and Saharanpur and enquiries can also be directed to Messrs. Bird & Co.'s Offices at Bombay, Cawnpore, Delhi and Lahore, Messrs. Brij Bhukhan Lal, Indra Sen of Saharanpur and Messrs. F. W. Heilgers & Co., Rangoon.

There is a high grade L. O. I. C. Oil for every purpose and prices will be found extremely competitive.

Certain-teed products, paints—varnishes—roofing. —Amongst the numerous exhibits of Messrs. F. W. Heilgers & Co., and Messrs. Bird & Co., will be found the display of the Paint and Roofing Department in stall No. 130. The well-known brand of Certain-teed Paint and Roofing is being put on the market by Messrs. Eastern Lubricants, Limited, Messrs. F. W. Heilgers & Co., Managing Agents, Chartered Bank Buildings, Calcutta.

There is a CERTAIN-TEED Paint or Varnish for every purpose.

The CERTAIN-TEED Paint and Varnish line includes :—

Factory paints	Engine enamels
Bath enamel	Copal varnish
House paints	Metal polish
Motor car enamels	Anti-corrosive paints
Universal varnish	Decorative enamels
Wood preservative	
Metal paints	Motor car color varnish
Snow white enamel	Furniture varnish
Bungalow paints	Motor car polish

The CERTAIN-TEED Roofing line includes: Two and Three-ply asphalt roofing.

Mineral surfaced roofing, Red, Green and Black Asphalt Felts, Plastic Cement, Roof Asphalt.

In addition to carrying complete Roofing, Paint and Varnish stocks in Calcutta, a Department is maintained to undertake Painting and Roofing contracts for any type of structure in any part of Northern India.

Any further information regarding prices, colours and specifications or literature, catalogues and colour cards will be gladly supplied, on application to Messrs. F. W. Heilgers & Co., Chartered Bank Buildings, Calcutta.

Indian Leather Manufacturing Co., Ltd., (Managing Agents, Messrs. Bird & Co., Calcutta) are exhibiting all grades of "Tiger Brand" boots and shoes made at their up-to-date Boot Factory in Kidderpore where the most modern boot manufacturing machinery is installed. Previously, it was not thought possible to produce in India boots and shoes equal in style, durability and finish to those manufactured in England and other parts of the world but an inspection of the now famous "Tiger Brand" footwear will convince even the most sceptical of critics that India can now compete with the world as far as boots and shoes are concerned. The Indian Leather Manufacturing Company's Boot Factory is equipped with the most modern, "almost human" machines by which high grade shoes are now manufactured and by studying local conditions, Messrs. Bird and Co.,

have been able to produce models of shoes which are most suitable for use in India.

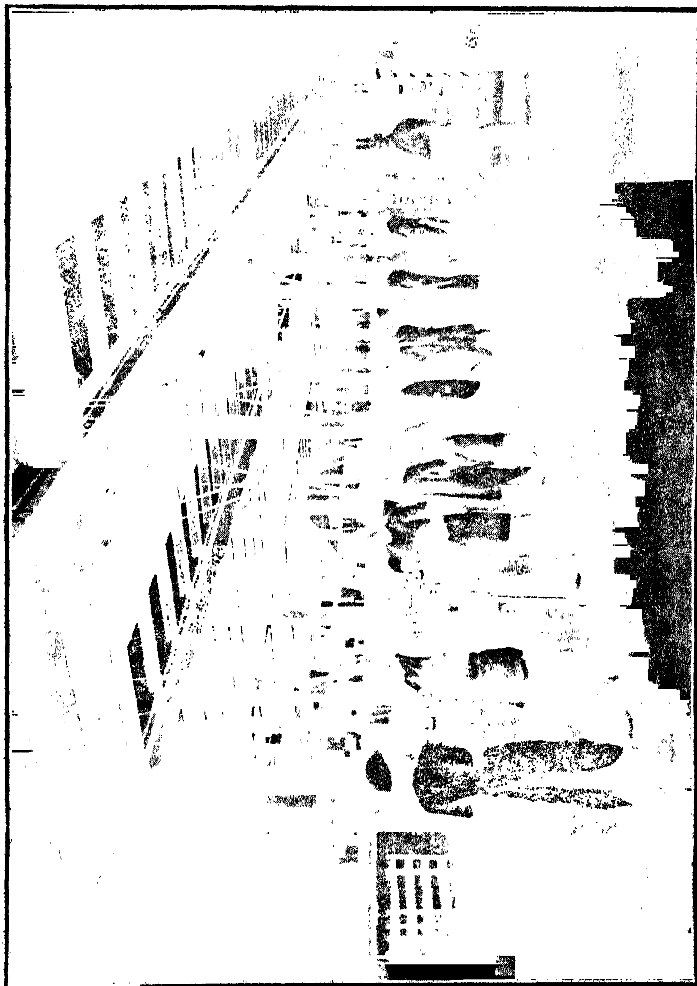
Certainly the fine models of black and brown Brogue shoes, Derby and Oxford shoes, Balmoral boots and patent leather Court shoes and slippers, which are displayed, are so excellently made and finished that they compare very favourably indeed with imported footwear. The designs are smart and distinctive and the models range from light shoes for town wear to stout boots for planters and hard work in the districts and "Ammunition" boots of strong, Russet leather for the Army and Police. In all the higher grades of "Tiger Brand" footwear, the "Goodwear" principle is employed and the shoes are closed, lasted, stitched to heel on the most modern machinery by expert Indian workmen, resulting in perfectly finished articles.

Another most important point to all interested in Indian industry is that "Tiger Brand" boots and shoes are entirely made from the finest qualities of chrome and vegetables tanned leather produced in India. Special attention is also drawn to the canvas, tennis and sport shoes with the new, fashionable, plantation-crepe, rubber soles secured to the light leather sole by a special process.

India Tanneries (Managing Agents, Messrs. Bird & Co.). Within the last few years, the business of tanning in India has greatly increased and developed on most modern lines. Instead of the tanning industry in India being confined to crust or slightly tanned cowhides, sheep and goat skins it now embraces the manufacture of fully chromed and vegetable tanned leather of all descriptions, ranging from sole butts and

bents to velvet finish coloured sheepskins and light fancy leather of all descriptions which are produced by the latest scientific methods.

In Bengal, Messrs. Bird & Co.'s enterprise, the India Tanneries, Kidderpore, is prominent in an



Bird & Co.'s Boot Factory.

industry and a visit to their stall will demonstrate the solid character and excellent finish of their production. They are showing Buffalo sole butts which are of a mellow and even tannage well rolled and admirably adapted to modern boot manufacture while their buffalo and cow harness leathers are well curried and finished for the special purposes for which they are made. Special attention is also drawn to the "Cook Brand" Box and Willow Chrome Sides which are principally used in the manufacture of high class footwear and also to the coloured sheepskins for linging in various attractive shades. Indian Tanneries also show suede-finish sheepskins and tanned iguana skins, especially suitable for making ladies shoes, hand bags, etc., while they display as well crocodile skins and buck skins tanned as trophies of the chase.

Stall No. 126 & 128.

North West Tannery Co., (Managing Agents, Messrs. Cooper Allen & Co., Cawnpore,) are exhibiting :—

1. Travelling goods—such as cabin trunks in leather and canvas, suit cases, blouse cases, attaché cases, soiled linen bags, hat boxes, collar boxes, tie boxes, holdalls, valises, golf bags in leather and canvas, special suit and attaché cases in real crocodile leather.

2. Saddlery, Harness & Equipment—such as set of black harness with nickel-plated mounts, cob size, set of tan harness with brass mounts, cob size, set of special "Reliable" harness, black racing saddle, polo saddle, all over English Hogskin Hunting saddle,

weymouth bridle, Running and standing Martingle, Polo boots, complete set of cavalry and equipment, belts, bandoliers, revolver holsters.

3. Boots and shoes—B/5 Pattern Regulation Army Boots, Grades, I, II and III. Derby and Oxford boots and shoes, shooting boots, waterproof "Monsoon" boots, football and cricket boots, special "Planter," "Kotah" and "Alexandria" pattern boots, Sandals, full and half slippers and pumps in tan and black full chrome calf and glacé kid, machine sewn, welted and fair-stitched makes Ammunition boots for Police, Forests, Native States, etc.

4. Leather—Full chrome black and tan calf and glacé kid. Coloured Suedes, sheepskins and real Moroccos, crocodile skins real and imitation, sole and harness leather, ammunition leather for army boots.

Stall No. 96.

CHAGANLAL & CO., P. O. BOX 3089, BOMBAY.

The firm are exhibiting artificial leather manufactured by Textile Leather Company of America, a large and enterprising firm.

The reputation and practical service of their products are borne out by such automobile users as the Caddilac, Buick, Chevrolet, Nash, Haynes, Chandler and Hudson for Body Building.

In addition to the automobile trade Textile leather is used for carriage and coaches, furniture upholstering, book binding, the manufacture of shoes, leather goods such as, trunks, bags, suit cases and other sundries.

The materials which are made up in clean cuts of 50 to 60 yards rolls, are said to be water, dust, stain and vermin proof and can be cleaned with soap and water.

The capacity of the working plant for a production of one day is approximately 20,000 yards.

Stall No. 99.

Gouripore Oil Company, Ltd., (Managing Agents, Messrs. Barry & Co., Lyons Range, Calcutta) are exhibiting linseed oils which they manufacture. Gouripore linseed oils are made in the following qualities :—

Raw,
Double boiled
Pale boiled
& special pale boiled.

The Company state as follows :—

Raw oil is the basis of all Gouripore Oils, is absolutely pure, is made from linseed without admixture of mustard seed and other deleterious ingredients, is a quick-drying oil, is very serviceable when used alone, is suitable for use with driers or with double boiled oil to impart elasticity to the paint coat.

Double boiled oil is the best for all-round work, is a full boiled oil, mixing perfectly with every kind of paint, is the quickest drying oil on the market for, under favourable conditions, two coats can be applied in one day, is very durable, is far superior to all ordinary mixture of raw oil and dries.

Pale boiled oil is specially made for use with white paints, is more economical than oils, is quick-drying and gives a glossy surface.

Special pale boiled oil is similar to pale boiled, but palter in colour, is suitable for making the finest varnishes, has all the attributes of the pale boiled oil.

Packing—is in 5 gallon iron drums and 40 gallon wooden casks. Unless specially requested and arranged for, the weight of oil supplied per "gallon" is the "commercial gallon" of 9 lbs. net, but any weight per gallon can be supplied, if desired.

Quality—the analytical specification, which is that adopted by the Indian Government Railways for Pure Linseed Oils, is adhered to.

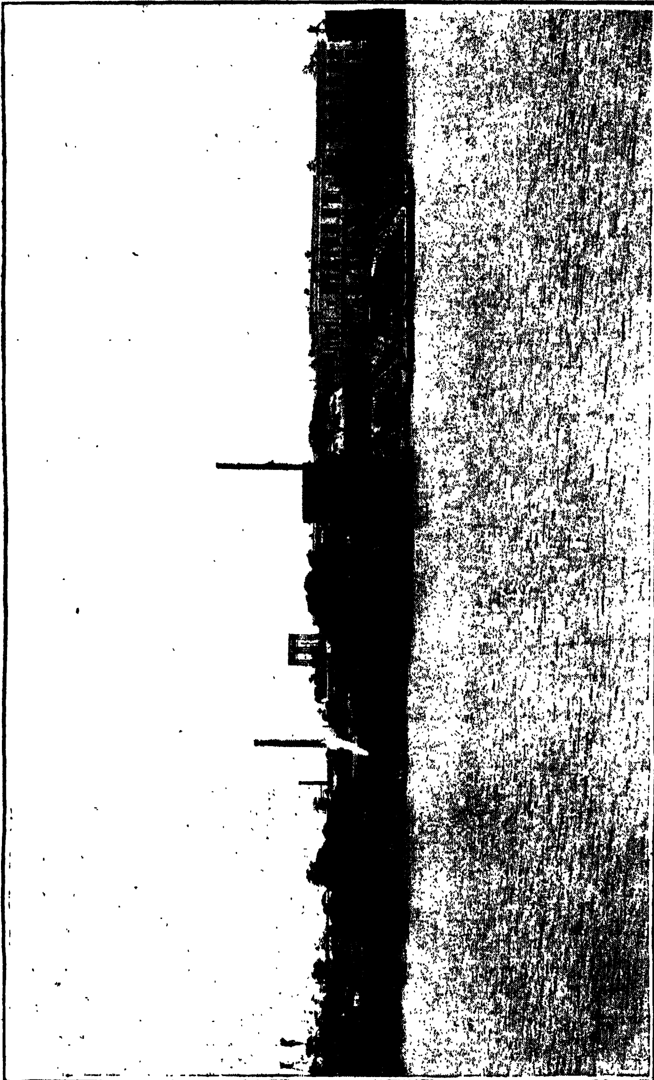
Stall No. 121 & 123.

SHALIMAR PAINT, COLOUR & VARNISH CO., LTD.,

4, COUNCIL HOUSE STREET, CALCUTTA.

This Company was registered towards the end of 1902 and has now had 21 years' experience of manufacturing paint in India and of studying on the spot the climatic conditions which paint has to resist in India. The works are situated on the Hooghly, a short distance below Calcutta; the accompanying block, made from a photograph shows the frontage from the Hooghly. A comparison with a photograph to be seen on the stand, showing the position of the Works early in 1903, shows the extensive development which has taken place. The Company works its own mines of red and yellow ochre and barytes, and is, therefore, in

a good position to ensure that its raw materials are of the proper quality. The Company also refines and



Shalimar Paint Works.

boils linseed oil, so that it ensures the excellence of the most important constituent of all paint.

On the stand are exhibited specimens of the raw materials mined by the Company and of many of its more important finished products. Particular attention is drawn to Red Corrugol, which is the paint for corrugated iron roofs and buildings, and to Lustrol, the Company's Special Aluminium Paint, two coats of which on ordinary iron-wear make the iron appear as if it were aluminium-plated. Other specialities which the Company manufactures in considerable quantity are colours for cement floors, black varnish, pale French polish and washable distempers.

The usual white and coloured paints (glossy and flat-drying), for ordinary protective and decorative purposes, are manufactured in steady quantity, also the usual range of varnishes and enamels.

Specimens are shown on the stand. In a corner of the stand will be seen samples of Road Tar and Coal Pitch manufactured by the Shalimar Tar Distillery and Waterproof Manufacturing Co., Ltd., the Works of which are adjacent to the Shalimar Paint Works. The Shalimar Tar Distillery has now had 4 years experience of manufacturing Tar and Pitch specially suitable for road-making, and is in a position to give advice to road-making authorities with regard to the latest and cheapest methods.

Robbialac.

Stall No. 118, 120, 122 & 124.

Messrs. A. J. Shelim & Co., Calcutta, India, are exhibiting the world famous Robbialac Enamel, whose

sole Agents they are. Their stand is actually finished with Robbialac. Robbialac is described as a super-grade enamel paint of unvarying quality which produces a beautiful lustrous surface comparable only to China, and owing to its composition it has no tendency to chip or peel, even under the most adverse climatic conditions. The great covering power of Robbialac combined with the fact that it is easy to apply makes it an ideal material for all classes of work where a first class finish is desired.

On the stall there are many exhibits such as Wheel Dises, Mudguard Sections, Panels, etc., etc., painted with Robbialac in the beautiful deep rich colours in which it can be obtained, and free leaflets on cycle, motor cycle and car painting are available.

The manufacturers also provide for those who are more interested in the enamel from a decorative point of view, for they are showing some novel wall sections and miniature doors beautifully decorated in delicate artistic colours to suit all possible requirements.

Experts are in attendance and are entirely at the disposal of visitors to give demonstrations and advice without obligation or fee.

Stall No. 125.

Messrs. Angelo Bros. Ltd., Cossipore, Calcutta. Their exhibits are confined to samples of the various qualities of Shellac, which they produce. They may be grouped as follows :—

(1) Superfines, our high grade Shellacs. Marks: Amber, B. B. T. N.

(2) Fines and Shellacs of T. N. grade. Marks: B. L. T. N., C. V. Y. N., A. B. T. N., No. 1 T. N.

(3) Low grade Lacs and Garnets. Marks: Comlac, A.C., C. Pure, C. Five, I. C. Kala.

The properties of the different marks briefly indicated are as follows:—Superfines, Amber—their best quality shellac, makes a good light varnish and an excellent bleach. Used for making Gramophone records, white varnish, etc.

B.B.T.N.—Slightly inferior to Amber, suitable for spirit or water varnishes and for bleaching.

Fines and shellacs of T. N. Grade:—

B.L.T.N.—A good quality T. N. used as a bleach lac.

C.V.T.N.—Similar to B.L.T.N., but giving an inferior bleach. Suitable for composition and varnish material, also for insulation purposes.

No. 1 T.N. A.T.N. quality superior to native T. N. Free from dirt and adulteration. Its chief use is in insulation.

A.B.T.N.—A good quality Shellac superior to the above marks, made free from dirt and unadulterated. Can be used wherever a good quality T.N. is required.

Low Grade Lacs and Garnets.—Comlac. A low grade lac containing more wax than normal shellacs. It is prepared in the form of thick slabs and can be used in manufacturing insulation and various compositions.

A. C.—A similar lac with a standard addition of 10 per cent. Rosin. It is rolled in ⅛ in. sheets. Has

many uses: as in making grinding wheels, boot polishes, composition and insulating material.

C.—Pure.—Garnet lac rolled in sheets, containing no Rosin.

C. Five and I. G.—Similar to C. Pure but with standard additions of 5 per cent. Rosin and 15 per cent. Rosin respectively.

Kala.—Prepared like C. Pure with 20 per cent. Rosin. It is sold in the form of buttons, or in the form of 1/8 in. sheets. The uses of Garnet lacs are manifold.

Bleaches and Varnishes.—Certain of their marks will be shown in the form of a stick bleach, water varnish and spirit varnish.

Stall No. 117.

Cossipore Sugar Mills Ltd., (Managing Agents—Turner Morrison & Co., Calcutta.) The exhibits of the Company consist of principally the ten varieties of refined sugar and the three varieties of sugar candy made by them. They are as follows:—

Extra First White.—An exceptionally large grained sugar of absolute purity. It is probably the largest grain produced by any refinery in the world. It is an excellent "Coffee Sugar."

First White.—A large grained crystal sugar, the finest that can be produced and chemically pure.

Small Grain.—A crystal sugar similar to First White, but of smaller grain.

Second White.—A beautiful granulated sugar of brilliant whiteness recommended for general use.

Crystal.—A medium grained White Crystal sugar of excellent quality.

Grocery.—A good all-round Fine White Grain Sugar, recommended where price is an object.

Castor No. 30.—A very Fine Grain Sugar recommended for household purposes and for Confectioners.

Castor No. 50.—A similar sugar to Castor No. 30, but of finer grain.

Icing —A special absolutely pure sugar of dazzling whiteness suitable for all kinds of Icing.

First Yellow.—"Grainy Yellow" a capital Grocery Sugar of Canary complexion and very sweet to the taste.

No. 1 Candy.—A "White" sugar candy of the finest quality obtainable, made from our highest grade sugars.

No. 2 Candy.—A sugar candy similar to the No. 1 candy but of a creamy colour.

No. 3 Candy.—A yellow sugar candy of excellent quality and very agreeable to the taste.

NOTE :—

"The above white sugars are made to fixed standards, nothing inferior to such standards being passed, but the colour of the yellow sugars vary slightly from time to time.

The fine colour of these sugars is solely due to their purity, no blue colouring being added to enhance the whiteness.

Stall No. 129.

SYLHET LIME CO., LTD.

25, Swallow Lane, Calcutta.

The Company are exhibiting unslaked lime—a sample of which was analysed by Messrs. Smith Stanistreet & Co., with following results :—

Calcium Oxide	...	97·45
Calcium Carbonate	...	0.08
Iron & Alimona	...	0.7
Silicious Matter	...	0.18
Magnesium Oxide	...	1.57
Loss	...	0.02
		100.00

Their Lime is quarried from a Strata in Sylhet which is exceptionally pure and free from extraneous matter. It is almost exclusively composed of shells, mollusces, etc., probably cemented together under high pressure in some pre-historic age, this peculiar constitution lending colloidal conditions to the lime produced and imparting besides the chemical properties a very high degree of cementing power. It is the purest lime obtainable in India and is therefore recognised as very efficacious both for chemical and fertilising purposes. Being fat lime it sets mortar harder and harder with age though it may not set quickly like Hydraulic Lime at the beginning.

Stall No. 10 & 12.

The American Eastern Tobacco Corporation Ltd., with which is incorporated the Atlantic Tobacco Co.,



Staff of American Eastern Tobacco Corporation Ltd.

Ltd., has acquired the large Cigarette Factory of the British India Tobacco Co. situated at Dum Dum, the machinery and buildings of which cost over Rs. 30,00,000 and has also acquired all rights in India of Messrs. F. & E. Soter Corporation, New York and Federal Tobacco Corporation of New York.

The American Eastern Tobacco Corporation have since installed machinery of the latest pattern and the Factory to-day has a capacity of turning out 10 million cigarettes daily and when in full operation will employ about 2,000 workmen.

The Company is fully equipped to turn out all grades of cigarettes and at prices to suit every class of smoker. The Factory is ideally situated, and having direct affiliation with the American Company, it is in a position to secure the best Grade of Virginia tobacco shipped direct from the Virginia Plantations to the Factory in Dum Dum, thus enabling it to produce the best possible quality of Virginia cigarette at the lowest price.

The Corporation has issued a very attractive booklet which illustrates the various brands of cigarettes and packages in original colours, also showing photographs of the plant in operation.

Stall No. 100.

BRUSHWARE LIMITED, CAWNPORE.

This Company, which was established as a private concern in the year 1887 claims to be the oldest factory of its kind in India. It has always been under European management. The factory is situated in

Civil Lines, Cawnpore, and the registered office of the Company is at 123/1, Halsey Road, the Managing Agents being Begg Sutherland & Co., Ltd., of Cawnpore. The Company have always encouraged the use of indigenous products in manufacture, and the training of Indian labour on up-to-date lines, to which end they have recently brought out a practical Brush Maker from London.

The Company manufactures a very large variety of brushes ranging from cheap boot brushes to high grade hair brushes. Their production includes brushes suitable for household and industrial use, mill brushes of all types, as well as brushes for Municipalities, Railways, ship chandlers, printing works, etc. The majority of the wood used is of Indian manufacture, but for the finer class of brushware satin or other woods are imported. Of the other kinds of material used the most important are bristle, fibre and hair. The Indian pig bristle is remarkable for its strength and wearing quality, although bristles from China and Europe are of a finer quality and more attractive in appearance. We use the latter quality for varnish brushes, sash tools and all classes of paint brushes.

The best qualities of fibre are white Mexican and Bahia Bass. The former is used chiefly for paint scrubbing and household purposes whilst the latter is imported for the manufacture of drain brooms, hard scrubs and is one of the stiffest and most durable fibres known. A form of whisk from southern India is also extensively used for carpet brushes and mane and tail brushes.

The Company have their own saw mills, as well as a complete equipment of planing, turning, moulding,

trimming, drilling, filling machines and nailing machines for flat varnish brushes. A clinching machine for the manufacture of tropical climate metal bound sash tools has recently been installed in order to meet the large demand for this class of brush, which is peculiarly adapted for use by unskilled labour and has hitherto been supplied from abroad.

The Company have for many years made a special feature of the manufacture of high grade toilet brushes and have established a high reputation for the excellence of their work in this department as well as in the refilling of ebony, ivory, silver and wooden backed brushes.

The Factory has for many years past been largely employed on Army and Railway Contracts, but a large trade has been steadily built up for household and domestic purposes.

The following medals and diplomas have been awarded to the Company :—

The only prize for brushes at the Punjab Sanitary Exhibition of 1893-94.

A Medal at the Jorhat Industrial Exhibition, tion, 1904.

A Gold Medal and First Class Certificate at the Indian Industrial and Agricultural Exhibition, Calcutta, 1906.

A Medal at the Jorhat Industrial Exhibition, 1907.

A Gold Medal at the United Provinces Exhibition, Allahabad, 1910-11.

etc. etc. etc.

Stall Nos. 112, 114 & 116.

DUNBAR MILLS LTD.

(*Secretaries Messrs. Kettlewell Bullen & Co., Post Box No. 121, Calcutta*).

The exhibits of this firm will show as far as possible, the result of each process in the manufacture of cotton yarns, twines and listings at our Mills from the raw cotton to the finished article and will consist approximately of the following :—

Raw Cotton, Cleaned Cotton, Caded Silver, Drawing Silver, Slubbing Rove on Bobbins, Intermediate Rove on Bobbins, Roving on Bobbins, Single Yarns on Bobbins, Single Yarn in Hanks, Single Yarn in Bundles, Doubled Yarn on spools, Ply yarn in Balls, Twines of all kinds in Balls, and Listings (Webbing).

Stall No. 132.

ELGIN MILLS CO., LTD. (Agents—Messrs. Samuel Fitze & Co., Ltd., 4, Government Place, Calcutta). The following articles will be exhibits by the Company—

Elgin Mills towels, sheets, table linen, dusters, twills, bleached drills, striped drills, rugs, union goods including meltons, plaiding cloth, circular sugar bag cloth, filter cloths, rolls of bandages, absorbent cotton, dhoties, balls of cotton twine, durries, farash, webbings and model tents.

Cawnpore Textiles—Cones of yarns, undervests-cotton, football jerseys, undervests mercerised socks

gents, stockings ladies, socks children, khaki mercerised turn-over hose and tubular putties.

Stall Nos. 65, 67, 69, 71 & 73.

INDIAN JUTE MILLS ASSOCIATION (ROYAL EXCHANGE, CALCUTTA).

The following are the exhibits by the Association :—

Samples of Gunny Bales.

Show samples of the following fabrics for shewing under glass :—

Hessians, canvas, D. W. Tarpaulin, Egyptian grain sack cloth, a twill cloth, Australian cornsack cloth, sugar bag cloth, cuban sugar bag cloth, D. W. flour bag cloth and heavy cee bag cloth.

One cut of each of above fabrics for hand samples. Sacking warp and weft sliver in glass fronted case hessian sliver in glass fronted case.

Filled Bobbins sacking weft rove.

,, ,, ,, warp ,,

,, ,, hessian rove

&c. &c. &c.

Bags for filling to form wall of stands.

Egyptian grain sacks, a twill bags, Australian cornsack, cuban sugar bags, D. W. flour bags, heavy cee bags, sugar bags.

Show samples of the following fabric for shewing under glass.

8 × 9 Australian woolpack cloth, also one out of the above fabric for hand samples.

16 Australian woolpacks 54 × 54 × 27, these bags for filling purposes to form wall of stand.

Hessian wine and Sacking Twine.

Stall Nos. 136, 138, 140, 142, 144, 146, 148 & 150.

THE BENGAL LUXMI COTTON MILLS LTD.

The Company's exhibits show, as far as is practicably possible owing to limitations of space, the stages of its manufacturing process up to the finished products from the raw Indian Cotton in bales to manufactured cloths and yarns of the varying fineness.

The bulk of the production of the Company's Mills, situated on the left bank of river of Hooghly at Rishra, eleven miles from Calcutta, finds a ready market in Bengal and the Company specialises in the manufacture of a good cheap durable dhuti to meet the ever increasing demand of the middle classes.

The mills contain 35,700 spindles and 720 looms; the counts of yarn vary from 10*s* to 40*s*; the heavy demands for "Banga Luxmi" dhuties and saries keeps all the machinery fully engaged in manufacturing the popular dhuties and saries of counts from 21*s* to 30*s* warp and 34*s*. to 40*s*. weft, with plain coloured borders varying from ½ to 3″ wide. These dhuties and saries are on exhibition, and for those who are interested in the trade, exhibits are made for finer qualities.

The exhibits comprise raw cotton in its various stages of manufacture into cloth from the card lap to

the reeled yarn and from the warpers bobbin to the finished, dyed, bleached or grey woven cloth. All the yarn exhibited—both single and double—is made at the Company's Mills and it can be truly said that it is Indian enterprise, organised to meet Indian's demands.

On entering the Bengal Luxmi Cotton Mills stalls the process of cotton manufacture is exhibited on the right of the entrance, but owing, as has been said, to the limitation of space, it has only been possible to show one machine under working condition. This is a 50″ power loom, motor driven running at 180 revolutions per minute. There are 720 of these machines installed at the Company's Mills which turn out nearly 30 miles of cloth each working day; and it will be of interest to visitors to see a 24 shaft Lancashire Dobby at work manufacturing fancy borders. On the left of the entrance are exhibited the various manufactures, referred to above such as dhuties, saries, twills, drills, bleached, dyed and grey cloth and yarn, and among other special features some wonderful waterproof cloth which resists any downpour however prolonged and yet leaves the cloth light and porous similar in texture to untreated fabrics. This cloth is being supplied to some of the leading Factory establishments in Calcutta. Some samples of umbrella cloth manufactured by the Mills also form a speciality.

The Company has its own Bleach and Dye Works and exhibits over 150 shades of Bleached and Dyed Yarn, put up in attractive 1 lb. bundles.

Coloured and grey hosiery yarns, durries, dusters, hospital requisites such as bandages, gauze cloths, etc., are also among the exhibits.

All visitors interested in the Textile Industry, are cordially invited to visit the Mills at Rishra. Passes for this purpose can be obtained on application at the Company's Head Office, 28, Pollock Street, Calcutta.

THE LISTER ANTISEPTICS & DRESSING Co., Ltd., started during the great European War, the Company continues to manufacture up-to-date surgical dressings of all kinds. Its Coal Tar Distillation Plant turns out disinfectant fluids and its by-products, which, for quality, are well-known in the market. It is a really pioneer Swadeshi concern organised by Bengali brain, supported mainly by Bengali capital and worked under Bengali management.

The exhibits comprise raw cotton in its several stages of manufacture into various kinds of medicated wool, such as boric wool, absorbent wool, etc. The exhibits also comprise raw coal tar from which are manufactured disinfectant fluids (Tajmahal and Phenocol Brands) and by-products such as, solvent naptha, crude carbolic ocid, crude napthaline, heavy creosote oil, anthracene, pitch, etc. The visitors will also find disinfectant soap, gauzes, bandages, lints and other medical requisites produced in the Company's Works. The exhibits will also include a special kind of jute dressings (absorbent jute wadding, carbolised and plain tow) which owing to their cheapness, are largely used by the Hospitals and Veterinary Departments all over India.

The Company's products are highly recommended by the Sanitary and the Industrial Departments of the

Government, by the Medical Institutions and Hospitals and by the Medical Profession all over India and Burma.

All visitors interested in the Industry and desirous of visiting the Works at 7, Umakanta Sen Lane, Dum Dum (few minutes' walk from the Dum Dum Junction Station on the E. B. Railway) are cordially invited. Passes for the purpose are available at the Company's Head Office at No. 28, Pollock Street, Calcutta.

Stall Nos. 66, 68 & 70.

THE MUIR MILLS CO., LTD., CAWNPORE.

(Cotton spinners & weavers, manufacturers of every description of cotton cloths, tents, durries, furnishing fabrics, etc., etc.).

This Model room displays one of the numerous unique schemes which are made possible with the use of Muir manufactures. The floor is covered with a Muir durrie in one of the numerous colour combinations which our range of 30 art shades affords. The curtains, loose chair covers, &c., &c., which make home comfort are completed from their selection of 26 art shades in furnishing fabrics.

Their representative on duty will be pleased to give details of the cost to reproduce (exclusive of furniture) a similar scheme or supply any information which may be required.

This exhibit displays one of their numerous designs of Tents. Famous for the past half century, Muir Tents have a reputation for their absolute reliability. Of the more recent notable achievements attained by Muir

Tents the foremost is their success with the Mount Everest Expeditions of 1921 and 1922, a test of durability which speaks for itself. The tent displayed is the regulation pattern Officers 80 lb. General Service Tent with detachable bath room. The interior of the tent (exclusive of camp furniture) is furnished entirely from Muir manufactures. Durries, mattress and pillows, bed-sheets, pillow cases—razai, counterpane toilet covers, towels are all of their manufacture.

Their representative on duty will be pleased to furnish full details of the complete cost of a tent and equipage (excluding camp furniture) exactly similar to that displayed or of any other of their Tents.

Displays their numerous manufactures of which they give a tabulated list—

Drills white and khaki	for clothing & uniforms.
Holland & Shikar cloths	for clothing.
Striped shirtings	for shirts, pyjamas and wash frocks, etc.
Casements-dosutis and coloured sheetings in a range of 26 art shades.	for curtains, chair covers and all soft furnishings.
Bleached striped and khaki twills.	for shirts, pyjamas, etc.
Indigo dyed dosuti	from which their tennis screens are made.
Towels	Durries.
Table linen	Farash.
Dusters	Groundsheets.
Bed Linen	Valises.
Bed Ticking	Hold-alls.
Counterpanes	Kit Bags.

Toilet cover material
Newars and webbings

Putties
Pugri cloths
Indigo Factory sheeting
Yarns
Chaddars, etc.

Soiled clothes bags.
Fancy check Horse cloths.

Dhotis.
Sheets.

Stall No. 94.

R. J. GUZDAR & CO.,

Calcutta Industrial Leather Works,
1, Pollock Street, Calcutta.

Manufacturers of—

Hydraulic and Mechanical Leather.—Leather belting (Rhino Brand) single, double and round, ram leathers or "U" Rings, pump buckets or washers, leather-on-edge rollers, picking straps, leather laces (chrome and oak tanned), and all descriptions of machine leathers for jute and cotton mills and presses.

Government requirements.—Pistol cases, gun cases, waist belts with pouches, postal and other cash bags, harness and saddles.

Railway requirements.—Roller leathers or washers, hose pipes (chrome and leather), guard belts, cash bags, &c. &c. &c.

Sundry requirements and fancy goods.—Suit cases, instrument cases, ornament and blouse cases for ladies, ladies' hand bags and purses of all descriptions, all requirements in leather according to specifications.

CHAPTER VI.

THE ENGINEERING SECTION.

Name & address of Exhibitors.	Stall No.	Nature of Exhibits.
1. Jessop & Co., Calcutta.	1	Engines & other machinery.
2. Calcutta Research Tannery.	2	Tanning materials, leathers &c. Tanning demonstrations.
3. Government Weaving Institute, Serampore.	3	Handlooms. Weaving demonstrations.
4. John King & Co., Ld., (Howrah) 5, Clive Street, Calcutta.	5	Ship-building and Engineering Requisites.
5. The English Electric Supply Co., Ld., Calcutta Branch, D4, Clive Buildings, Calcutta.	6	Electrical appliances such as motors, generators, suitable starters &c., &c. Electrical supplies generally. Also cables, Dry cells, Telephones &c.
6. Oriental Electric Engineering Co., 19C, Bowbazar Street, Calcutta.	7	Electric appliances, fittings, machinery &c.

Name and address of Exhibitors.	Stall No.	Nature of Exhibits.
7. The British Arc Welding Co., (India) Ld., Managing Agents, Messrs. Mackinnon Mackenzie & Co., Calcutta.	8	Electric welded specimens of light machinery (in motion demonstrating the firm's process).
8. Calcutta Port Commissioners, Calcutta.	9	Model of the new dock.
9. Calcutta Improvement Trust.	10	
10. Martin & Co., 6 & 7, Clive Street, Calcutta.	12	Machinery & articles for Engineering. Tanning exhibits, Light Railway materials.
11. The Kumardhubi Engineering Works, Ld., The Kumardhubi Fire-clay & Kumardhubi, Barakar, E. I. Ry. Silica Works,	14	Colliery engineering requisites, all types of Silica bricks, fire-bricks, Glared stoneware, pipes and other refractory materials.
12. J. B. Norton & Sons, Ld., Norton Buildings, Calcutta.	15	Sanitary fittings.

13.	Ivan Jones, Ld., 12, Mission Row, Calcutta.	19	Machinery & electrical equipment, belting & belt-dressing, Dearborn scientific feedwater (scale & corrosion exhibits) &c., &c.
14.	Mallan & Co., 117, Foreshore Road, Sibpur, Howrah.	20	Railway permanent way material manufactured by the firm from Indian raw material.
15.	Fairbairn Lawson Combe Barbour (India), Ld., Managing Agents Bird & Co., Chartered Bank Buildings, Calcutta.	21	Jute machinery, spare parts, General Engineering, casting &c.
16.	Goldberg Bros., 11, Clive Street, Calcutta.	22	"Lemaire Water Pump".
17.	The Empire Engineering Co., P.O. Box 16, Cawnpore.	24	Pollock Horizontal & vertical engines & Pollock pumps, Ashford strainers, Iron & wood railway keys, lamp posts &c.
18.	Incell & Silk, Ld., Esplanade Mansion, Esplanade Lane.	25	Plumbing materials.

	Name & address of Exhibitors.	Stall No.	Nature of exhibits.
19.	Dass & Co., 14, Cossipur Road, Calcutta.	29	(Locks, safes, strongroom-doors, doors, Boxes &c.).
20.	Vulcan Iron Works, 172, Lower Circular Road, Calcutta.	30	Structural steel castings in Iron & Brass, Mill gearing machinery &c.
21.	Planters Stores & Agency Co., Ld., 11, Clive Street, Calcutta.	31	Oil engines pumps, fans, suction gas producer. } moving exhibits.
			Belting, wire ropes, Light Railway materials.
22.	Consolidated Construction Agencies, Ld., 21, Old Court House Street, Calcutta.	33	Re-inforced concrete, Truscon building products chemical, press-steel &c.
23.	Crossley Bros., Ld., 3A, Vansitart Row, Dalhousie Sq., South, Calcutta.	34	Oil engines, gas engines & gas plants (working models).
24.	Heatly & Gresham, Ld., 6, Waterloo Street, Calcutta.	36	Water elevators, machinery, roofing material, small engines.

25.	Alfred Herbert (India), Ld., Calcutta.	37	Machine, tools &c.
26.	Ahmuty & Co., 30, Strand Road, Calcutta.	38	Engineering stores, petrol lamps, wood working & other machinery, handloom, rope & mill stores, tarpaulins, paints &c.
27.	W. T. Henley's Telegraph Works Co., Ld., Old Court House Street, Post Box 390, Calcutta.	39	Electric wires & cables, joint & terminal boxes, insulators, electric coal cutters, motor tyres.
28.	Britannia Engineering Works, C/o. McLeod & Co., Calcutta	40	Castings &c.
29.	Ewing & Co., Managing Agents, Jardine Skinner & Co., Calcutta.	41	Asbestos, cement, building sheets, paints, enamels, varnishes, wire ropes, brushes.
30.	Ghatak & Co., Ray Bahadur Road, Behala, Calcutta.	44	Match machinery, agricultural machines, paddy husking machines, pumps, &c.
31.	Webber & Co., 3, Mission Row, Calcutta.	46	British India Collapsible Steel Gate Co.'s gates made in India.

	Name and address of Exhibitors.	Stall No.	Nature of Exhibits.
32.	W. & T. Avery, Ld., Waterloo Street, Calcutta.	47	Weighing, testing and counting machines.
33.	Krishna Tap Works, C/o. Rai Saheb Krishna Dhone Bannerjee, Sibpur, Howrah.	48	Krishna tap for preventing waste of filtered water, brass cocks, whistles, &c.
34.	The Pioneer Nail Manufacturing Co., 168, Manicktollah St., Calcutta.	49	Wire nails.
35.	B. D. Bery & Co., 43, Ripon Street, Calcutta.	50	Oil engines and machinery.
36.	Beros Bros.	51	
37.	W. B. Lowson & Co., 116, Ripon Street, Calcutta.	52	Weighing machines of all description & weights.
38.	Symington Cox Co., Ltd., 4, Mission Row, Calcutta.	53	
39.	Ashutosh Auddy, The Oriental Type-foundry, 76, Lower Chitpore Rd., Calcutta.	54	Printing machinery and materials.

40.	Cole & Wilsone, 69, Elliott Road, Calcutta.	55	Printing presses.
41.	Octavious Steel & Co., 14, Old Court House St., Cal. for Bazaboni Tea Co., Assam.	57, 58 & 59	Tea sorter.
42.	B. A. S., Ld., (Bengal Artificial Stone Co.) 15, Clive Row, Calcutta.	60	Artificial stone.
43.	Holmes Wilson & Co., Ld., Henley House, Calcutta.	75	G. P. vibrating table for reinforced concrete work.
44.	Mirrless Watson & Co., 11, Clive Street, Calcutta.	76	Sugar machinery, condensing plants, water distilling & oiling plants, &c.
45.	Skefko Ball Bearing Co., Ld., 1/13, Govt. Place East, Post Box 588, Calcutta.	77	Ball & roller bearing and transmission accessories for all purposes.
46.	James Murray & Co., 12, Govt. Place, Calcutta.	78	Surveying, engineering mathematical & optical instruments, &c.
47.	Vickers Ld., 9, Clive Street, Calcutta.	79	Vickers steel products, drills, files, small tools, tool steel, &c.
48.	Calcutta Pottery Works, 45, Tangra Road,	80	Potteries, electrical porcelain.

	Name & address of Exhibitors.	Stall No.	Nature of Exhibits.
49.	The Russa Engineering Works, Ld., 110/1, Russa Road, Bhawanipur, Calcutta.	81	Motor cars, Veritys electric motors, fans, regulators, switch gear & Maxlume fittings, Philips electric lamps, electrical accessories of every description, Delcolight electric generating plants.
50.	Vacuum Oil Co., 2, Clive Row, Calcutta.	82	Lubricating oils and greases.
51.	Parry & Co., (Parry's Engineering, Ld.) 11, Clive Street, Box 208, Calcutta.	83	Light railway materials, concrete machinery, sugar, chemicals, &c.
52.	Ingersol Rand (India) Ld., 5, Council House Street, Calcutta.	84	Air compressors (for petrol), electric drives, pneumatic riveters, chippers, drills, &c.
53.	W. H. Harton & Co., 8, Canning Street, Calcutta.	85	Ropes. An arch of Manila and coir ropes.
54.	Crown Engineering Works, Howrah	86	Pumps, presses, oil mills, industrial plants, &c.
55.	K. Bannerjee & Co., Printing Machinery Works, 133, Canning Street, Calcutta.	87	Printing machinery.

Stall No. 6.

THE ENGLISH ELECTRIC COMPANY, LD. (Clive Buildings, Clive Street, Calcutta) are exhibiting small Industrial A. C. and D. C. Motors and Generators. Small switch boards and switch gear both of the Marble panel and Iron clad types, house service pumping sets, electrical supplies and accessories including wiring materials, lighting fittings, 'Export'' fans, "Siemens" electric lamps, domestic heating appliances, etc.

The firm are the Sole Agents for India for Siemens Bros. & Co., Ltd., Woolwich manufacturers of V. I. R. and paper insulated electric cables, dry cells, telephone instruments, etc. A representative display of their productions are shown in their stall.

Stall No. 12.

MESSRS. MARTIN & CO., 6 & 7, Clive Street, Calcutta, are exhibiting the products of (1) National Tannery, (2) The Eastern Light Casting Company, (3) The Bengal Iron Company, Ltd., & (4) Light Railway materials by Messrs. Robert Hudson (India) Ltd.

The Products :—

The special line of the National Tannery is the manufacture of Boot and Shoe Upper Leather from cow hides, known in the trade as :—

I. Black Box Sides.

II. Chrome Willow Sides in the various popular shades and colour.

Besides this special line the tannery also produces limited quantities of the following varieties of leather :—

III. Glace Kid both in black and popular shades of brown.

IV. Upholstery leathers for Motor Cars, Carriages and Furniture :—

(*a*) Embossed Enamelled hides in black, bottle green, pink and claret shades.

(*b*) Antique leather in various fancy shades.

V. Embossed bark tanned hides for making leather trunks, suit cases &c.

These are made in various attractive prints, *e.g.* Crocodile, Lizard, Pig grain, short and long grains.

VI. Mill leather, *e.g.*

(*a*) Chrome Picking Bands for Cotton and Jute weaving Looms.

(*b*) Chrome Laces.

(*c*) Martingale straps.

(*d*) Roller leather.

(*e*) Chrome Belting.

VII. Chrome Sole Leather both stuffed and unstuffed.

VIII. Leather Trunks, suit cases and attaché cases.

Superiority of National Tannery Leathers :—

National Tannery leathers enjoy a good reputation. The National Tannery leathers have been tried for years. No inferior raw materials are used in making them. The tanning process is kept up-to-date. Every new technical improvement, be it in connection with

the process or with machinery, is quickly adopted. A staff of research workers is always engaged in raising the standard of quality. A rigid "Costing System" is maintained to combine economy with efficiency.

Terms of Business :—

Quotations for the various products of the tannery as well as the terms of business may be had on application to the Managing Agents, Messrs. Martin & Co., 6 & 7, Clive Street, Calcutta.

The exhibits of the Eastern Light Castings Company, Ltd., include Rain Water Pipes and Fittings, Soil and Ventilating Pipes and Fittings and a variety of Light castings for Railway, Electrical and General work.

Rain water, ventilating and Boiler Pipes are made in lengths up to 6 feet and from 2″ to 4″ diameter while a large variety of fittings suitable for these pipes are obtainable. Only a few of the many patterns are shown as illustrative of types manufactured.

The Company aim at standardisation and whenever possible the plant is prepared for quantity production.

The same methods apply to light castings generally. Electric and Pneumatic machines having been installed to produce repetition castings of the finest quality and accuracy.

Although the works have only been a short time in operation the Company has already earned a high reputation for the quality of its products and demonstrated that they can supply castings equal to the best imported.

THE BENGAL IRON CO., LTD., (MANAGING AGENTS, Messrs. MARTIN & Co.)

CAPITAL £25,00,000.

Visitors to the Exhibition should make a point of visiting the Stand of the Bengal Iron Co., Ltd. a Company incorporated in England and whose Works are situated at Kulti in Bengal.

This Company's Works are the largest of their kind east of Suez and their exhibits are of both technical and general interest. With a complement of five Blast Furnaces, four Batteries of Coke Ovens Collieries, Iron Ore & Limestone deposits, the Company are in a position to manufacture upwards of 1,50,000 tons of pig iron per annum.

Their Foundries are many and varied and are designed to turn out cast iron drainage pipes to British Standard Specification, Railway Sleepers, and general and special castings of every description. Last year 6,737 tons pipes, 21,446 tons sleepers and 5,442 tons general castings were turned out in these foundries, the majority being supplied to Railways and Government Bodies.

Specimens of the various castings, bye-products and metals are available for inspection at the Company's stall.

BENGAL FIREBRICK SYNDICATE WORKS, KULTI, BENGAL.

This is a private concern, subsidiary to the Bengal Iron Co., Ld. and is managed by Messrs. Martin & Co.

Its inception during the War was due to the great difficulty in obtaining Refractory Material from Great Britain and its Works at Kulti were erected primarily to supply the Bengal Iron Co., Ld. with Firebricks & Fireclay for lining their Blast Furnaces and Coke Ovens.

Under expert management and with excellent deposits of clay at their disposal Furnace Lining Blocks, Flue Covers &c. were manufactured equal in every way to the imported article and although the Bengal Iron Co., Ld. have first claim on their output the Syndicate is in a position to supply to outside customers, certain quantities of this class of material.

A visit to Stall No. 12 is recommended to those who are interested in Refractories.

The exhibits of Light Railway Materials by Messrs. Robert Hudson (India) Ld., (Martin & Co., Managing Agents) at Stall No. 12 will doubtless prove of great interest to the visitor to the Exhibition. Various types of track, wagons, etc. are to be seen. For instance, one can observe the very latest type of Hudson "Victory" Tip wagon, a feature of which is the pressed steel standard and improved bridle catch. Of course, it is impossible to exhibit everything that this well-known firm make at their Kidderpore Workshops, Sastitola Road, but Messrs. Hudson would be pleased to afford every facility for inspection at any convenient time.

Stall No. 14.

The Kumardhubi Engineering Works, Ltd.,

The Kumardhubi Fireclay & Silica Works,
Kumardhubi, Barakar, E. I. Railway.

The FIRECLAY AND SILICA WORKS is divided into three main groups—(1) Silica, (2) Fireclay, (3) Stoneware.

I. THE SILICA DEPARTMENT is the only Works of the kind in India and produces about 15,000 tons of Silica Bricks a year of quality equal to the best Silica Bricks made in Europe or America.

GRINDING MILL.—In the Mill House are six heavy type Grinding Machines, electrically driven, capable of handling about 10 tons of Quartzite an hour.

MOULDING.—The Regular Silica Bricks are made on a Steel Plate, placed on Rack Cars and passed through Drying Tunnels preparatory to being set in the Kiln.

Shapes of all classes are moulded on Steam Heated Drying Floors, where they remain until passing to the Kilns.

KILNS.—The plant consists of 10 Beehive Down Draught Type of Coal Fired Kilns, each having a capacity of ½ lac of Bricks.

QUALITY.—The quality of the Kumardhubi Silica Bricks has been most favourably reported upon by Dr. Mellor, Director of

Central School of Science and Technology, Stoke-on-Trent, England.

II. THE FIRECLAY DEPARTMENT produces Firebricks of excellent quality suitable for all classes of refractory work, such as in Coke Oven linings, Blast Furnace linings, Cupola work, Boiler setting and Glass Factories.

MOULDING.—Regular Bricks are made by Machinery of the latest design at the rate of 12,000 per day.

Shapes are moulded on Hot Floors, where they dry preparatory to setting in Kiln.

KILNS.—There are two classes of Kilns—

(1) Regenerative Gas Fired Continuous Kiln of 10 chambers, capable of producing 10,000 Bricks per day.

(2) A Battery of 8 Beehive Down Draught Coal Fired Kilns, each holding 25,000 Bricks.

III. STONEWARE GLAZED PIPES.—This department produces a high class Salt Glazed Pipe, from 4 inches in diameter to 24 inches in diameter.

MOULDING is done on machines of latest design, working to British Standard specification.

KILNS.—A Battery of 5 Beehive Type Kilns, capable of turning out a very highly Salt Glazed article.

THE KUMARDHUBI ENGINEERING WORKS.—These were originally the old repair Shops of the Burrakar Coal Co., and were floated into a

Limited Company in 1915 and afterwards extended to their present size.

THE FITTING AND MACHINE SHOPS have now developed into thoroughly well-equipped Shops with machines of modern design and Electric Travelling Cranes capable of handling any type of work required in the Colliery area.

THE CONSTRUCTIONAL SHOP is fitted with a Battery of Asquith's High-speed Radial Arm Drills, and with both Pneumatic and Hydraulic Rivetting plants.

An Electric Crane is in course of erection.

THE FOUNDRY is equipped with an Electric Travelling Crane of 5 tons capacity, two 6 ton per hour Cupolas, and Metal-melting Crucible Furnaces.

THE SMITHY is equipped with 2 Electrically driven Hammers.

THE STORES have been developed along modern lines and now carry stocks of Colliery requirements in addition to materials carried for our own Shops' consumption. Large orders for all types of Colliery stores have been placed in England, which will shortly arrive and place the Company in a very favourable position to meet all demands from the Coal-fields.

Stall No. 36.

MESSRS. HEATLY & GRESHAM, LTD., 6, Waterloo Street, Calcutta. The main exhibit of this firm consists of a small house covered with Italit Asbestos, corrugated sheeting. They are also

exhibiting one of their patent "Marvello" and Chain Helice Water Elevators.

Stall No. 38.

MESSRS. AHMUTY & CO., LTD., Manufacturers, Metal and Hardware Merchants, Contractors and Agents, 30, Strand Road, Calcutta rank as one of the oldest business houses in the city, having been established in the year 1815.

Messrs. Ahmuty & Co., have four stalls at the Calcutta Exhibition for the display of the products of the Companies mentioned above. Two of these are located at the head of the entrance to the Grass Ride one in a prominent position of the Food Products Section and one in the Machinery and Engineering Section. The two stalls in the General Section will have a display in addition to the goods referred to, of a very interesting exhibit describing the process through which the radium is applied to dials of Ingersoll Watches. This consists of photographs and actual specimens illustrating the mining of Carnotite Ore in the wonderful Paradox Valley of Coloredo. The Photographs and specimens show the nine different steps through which this Carnotite Ore goes before it is ready for application on the radiolite dial of Ingersoll Watches. This is a most interesting and instructive exhibit because one can see in the bottle containing the final specimen several grams of the radiolite material. It displays in very graphic form the tremendous energy that can be transmitted by a very infinitesimal quantity of radium. In another bottle is contained two dummy phials showing the

amount of radium extracted from one ton of Carnotite Ore and the amount obtained from 250 carloads. The value of these is roughly Rs. 1,600 and Rs. 39,000 respectively.

This exhibit has been specially prepared for the Calcutta Exhibition by the United States Radium Corporation who are sole Concessionaires of the Ore in Paradox Valley. This Corporation furnish the Ingersoll Watch Co. with Radiolite material for Ingersoll Watch dials.

Another interesting exhibit in the same section of the Exhibition will consist of original paintings in oils by the celebrated American artist, William Mead Prince. These illustrations are three of a set of paintings specially executed by this artist for the use of the Pepsodent Co. in their Publicity Department. Their value is Rs. 550/- each. This serves to illustrate that the Pepsodent Co. are firmly convinced that their product is the best in the field of dental science for the cleansing of teeth and more particularly in preventing Pyorrhea. They, therefore, consider that nothing but the best art work should illustrate their product to the public and for this reason have no hesitation in commissioning one of America's foremost artists to illustrate their advertisements. One of these pictures will be on display each week together with reproductions of the advertisements they serve to illustrate.

The most interesting exhibit of the lot will be shown in the Engineering section where the absolute safety of the Coleman Quick-Lite will be demonstrated daily in very graphic form. Lamps and Lanterns will be on display to illustrate the efficient method by which the Quick-Lite is manufactured. There will be several

mechanical devices showing how absolutely danger-proof the Coleman Quick-Lite is.

Messrs. Ahmuty & Co. have Branches in Bombay, Rangoon and Cawnpore.

Stall No. 39.

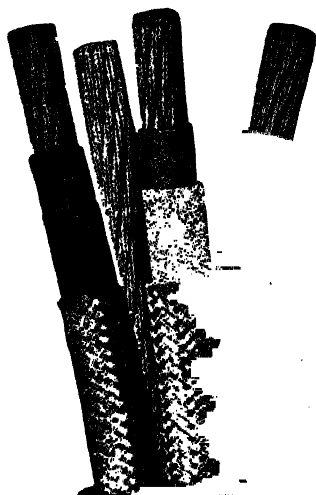
Messrs. HENLEY'S TELEGRAPH WORKS CO., Limited.

Old Court House Corner, Calcutta.

Messrs. Henley's Telegraph Works Co., Ld., have a comprehensive exhibit both of their own manufactures, such as Electric Wires & Cables of every description, Joint and Terminal Boxes, Service Fuse Boxes, etc., and of those of manufacturers for whom they act as Sole Agents in India, these latter including "Telenduron" Insulators, "Diamond" Coal-Cutters and Gate-End Boxes and the well-known Insulating Varnishes, Anti-Sulphuric Enamels, &c., manufactured by Messrs. Griffiths Bros. & Co., (London), Ld.

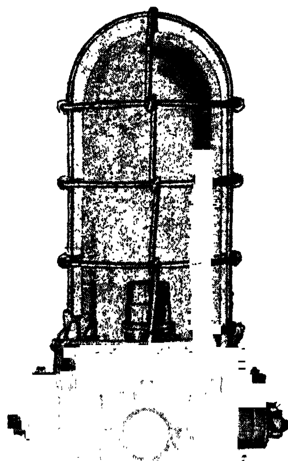
The Exhibition has come at an opportune moment for this firm, as they have only recently made several very great improvements in connection with Electric Transmission and Distribution apparatus. First place among these developments must be given to the *Henley Improved Type of "Cab-Tyre Sheathed" Trailing Cable,* for Colliery and Workshop use. "Cab-Tyre Sheathing" has now for some years been recognized as the best and only satisfactory finish for Trailing Cables, as no other form will stand the rough usage to which they are subjected but even "Cab-Tyre

Sheathing" (*i.e.* a sheathing of hard rubber compound similar to that used in the manufacture of Tyres) is liable to damage, and serious accidents have occurred owing to the sheathing having been cut through by sharp-edged or pointed pieces of metal, resulting in contact being made with the "live" conductors of the cable. To get over this dangerous possibility, it was suggested in the Revised Mining Rules published in England in April 1921, that an additional Earthing Conductor consisting of a Copper Braid should be embedded in the Cab-Tyre Sheathing so that in the contingency referred to above, the fault would be immediately "earthed" through the copper braid. This would be a distinct improvement on the ordinary type of Cab-Tyre Sheathed Cable, but it would still have serious defects, as will be at once apparent to engineers conversant with such matters. Messrs. Henley's have gone a step further, and patented a cable in which an *Earthed*

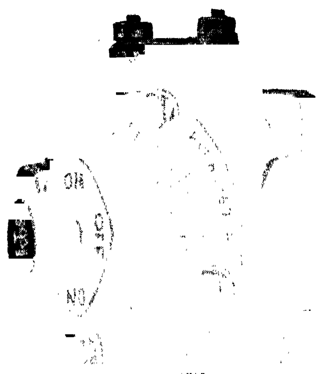


Henley's Patent Improved Type of "Cab-Tyre Sheathed" Trailing Cable, for Collieries, Works, &c.
(Note the Copper Braid Earth Sheath round *each* of the power cores.)

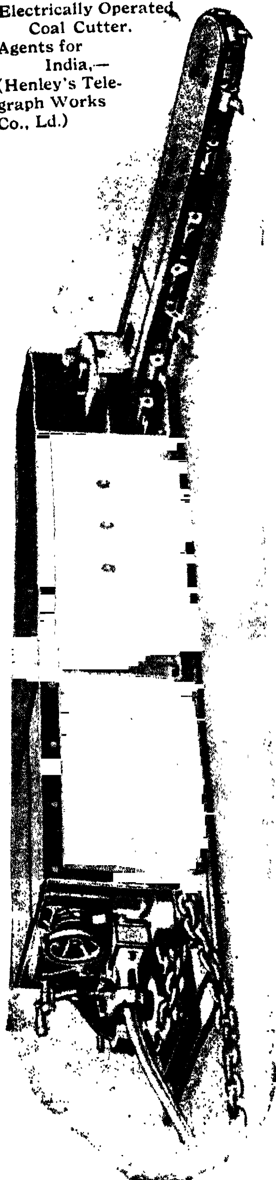
Tinned Copper Braiding surrounds each power core of the cable, a simple improvement but one having far-reaching effects, whilst they have also patented a similar type of cable but with the Earth Sheaths round the individual cores consisting of Tinned Copper Wires laid on in an Open Spiral. The former method,—of which an illustration is given,—is probably the more effective of the two, but is rather more expensive than the latter. Either form of cable has the same advantages over ordinary cables as that suggested in the Mining Rules, and has in addition further advantages which will be obvious to Electrical Engineers and which make this Improved Type of Trailing Cable (with either form of earth sheath) *absolutely the safest that has been, or, probably, can be, devised.* These cables have already been adopted extensively in India, although they have only been on the Indian market for less than a year.



"Henley" Colliery Lighting Fitting. Fireproof Waterproof, Foolproof.



"Henley" Colliery Lighting Switch. Fireproof, Waterproof, Foolproof.


The Diamond Coal-Cutter Co's Electrically Operated Coal Cutter. Agents for India,—(Henley's Telegraph Works Co., Ld.)

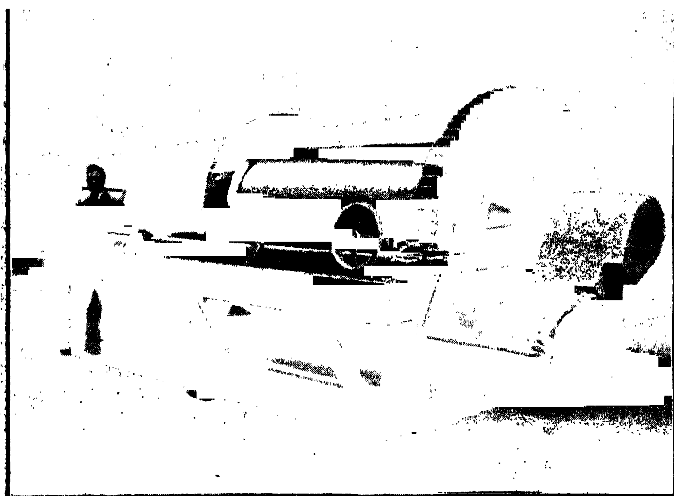
Other recent improvements made by Messrs. Henley's in connection with Mining work include their new range of *Colliery Joint Boxes* with *Internal Bonds,*—which obviate risk of possible breakage or corroding away of the copper bonds,—and a new range of *Patent Colliery Lighting Fittings,* all parts of which, including the switches, are waterproof, fireproof and fool-proof. This system of Colliery Lighting has features not embodied in any other system.

In view of the large amount of Colliery work done by Messrs. Henley's, they have recently been entrusted with the Sole Agency for India for the *Coal-Cutters and Gate-End Boxes* manufactured by the Diamond Coal-Cutter Co., Ld., of Wakefield, and their exhibit includes specimens of both of these, and of other mining specialities of their own and of the Diamond Coal-Cutter Co.'s manufacture.

In connection with Messrs. Henley's Telegraph Works Co., Ld., it is almost superfluous to refer to the *Henley Wiring*

System, as it has had such phenomenal success in India, as elsewhere, since it was first introduced in the year 1912, that "Henley Wiring is now almost always specified for buildings of any importance. Imitations, of more or less merit, have since been put upon the market, but "Henley" continues to hold its own. A new accessory of the System, the "Jacob Earth Detector", is just being put upon the market, after extensive tests, and it is hoped that the manufacture of the commercial article will be completed in time to show at the Exhibition.

In the Aerial Section of Messrs. Henley's exhibit, will be seen specimens of the *Aerial Fuses* which they have recently designed for Overhead House Services,



"Henley" Hand-operated Winch, for Sinking-Pump Cables, &c.

and which have met with instant success, and a range of *Indoor Fuse Boxes for Overhead Services,*

—as designed originally for use in Simla, and since adopted also by other centres having overhead distribution. The special feature of these Boxes is that the conductors are brought direct into them through a tube let into the wall. Mention must here be made, also, of *"Telenduron" Insulators* manufactured by Messrs. Thos. De la Rue & Co., Ld., for which Messrs. Henley's, as mentioned above, have the Sole Agency for India and Ceylon. These Insulators, which are made in all the usual patterns for Telegraph Telephone and Power Distribution purposes, are moulded from a special fireproof material having excellent insulating qualities, and being non-hygroscopic and practically unbreakable.

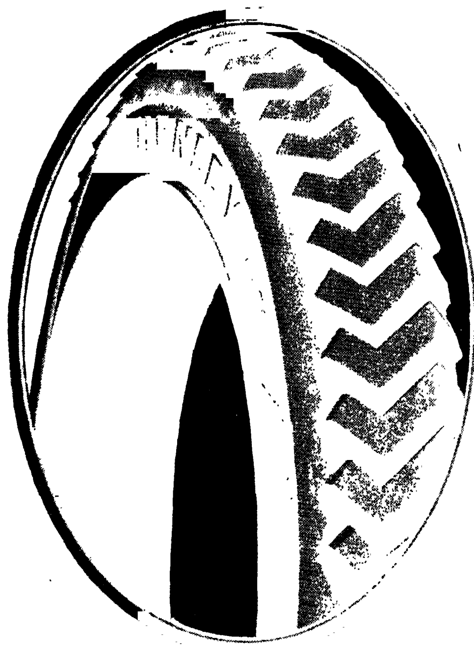
They are largely replacing Porcelain and Earthenware Insulators, and may be seen in use locally on the poles of the Bengal Telephone Co., Ld., who have recently been replacing their Porcelain Insulators with "Telenduron". They are recognizable by their black colour as compared with white porcelain or brown earthenware.



"Henley" Patent Aerial Fuse, for Overhead services, (made in three sizes.)

For heavy cables for *Underground Transmission*, power transmission in Mills, Collieries, &c., Messrs. Henley's are, of course, one of the leading firms. Space will only allow mention of a few contracts carried out by them in recent years, but these include all the

Cable Work in the Alexandra Docks, Mazagaon Docks (P. & O. & B. I. S. N. Co.'s) and R. I. M. Dockyard at Bombay; the Elgin Mills, New Victoria Mills, Cawnpore Textiles and Baijnath Balmukand Mills, Cawnpore; Empire Jute Mills, Calcutta; New Model Mills, Nagpur; Tata Mills, Bombay and many others. A recent improvement which they have put on the market in connection with Underground Distribution Work, is the *Henley "Unit" Type of Feeder Pillar.* These



"Henley" Pneumatic Tyre.

"Units" are now in use throughout Calcutta by the Calcutta E. S. Corporation, Ld., and are also in use in

Bombay, whilst specimens are shown on Messrs. Henley's stall. They constitute a great improvement on the arrangement of Feeder or Distribution Pillars in the past.

Last, but not least, among Messrs. Henley's manufactures, must be mentioned *Henley Tyres* and incidentally, *"Why Not" Golf Balls*. Both these are actually manufactured by a subsidiary Company, Messrs. Henley's Tyre and Rubber Co., Ld., for which reason only they are mentioned last. The Company was only formed just before the War, and during the War the whole output was taken up by the War Office, whilst although the Works have been trebled in size since, it is only recently that they have been able to overtake the home demand, and send Tyres to India. Their reputation had, however, come in advance and the difficulty has been, we understand, to keep up sufficient supplies both of Solid and Pneumatic Tyres, to meet the demand since they were put on the Indian market.

Stall No. 41.

MESSRS. EWING & Co. (Managing Agents, Messrs. Jardine Skinner & Co.) 4, Clive Row, Calcutta, are exhibiting—

(*a*) "Paripan Enamels", varnishes and paints.
(*b*) "Everite" Asbestos cement corrugated and flat sheets and slates.
(*c*) William Cook & Co.'s (Sheffield), Wire Ropes.
(*d*) Cuirass Anti-Corrosive paints.

(e) Hamilton's paint and varnish brushes, which are well-known and consistently of good quality.

Stall No. 47.

Messrs. W. T. Avery, Ltd., Waterloo Street, Calcutta.

The firm are exhibiting Avery's Patent Automatic Weighbridge fitted with patent "Lead on rails" and Automatic Indicator which has been specially designed for the quick and accurate weighing of Goods Trains.

Indicating Mechanism. This is designed to eliminate friction. Neither water nor any other fluid plays a part in the indication of leads; consequently this mechanist is unequalled for reliability and variation of temperature does not affect the accuracy of the Machines. The whole of the Indicating Mechanism is enclosed in a strong wrought iron casing to protect it from dust. The dial and the indicating pointer are protected by glass, the dial mechanism is relieved from all loads when not in use for weighing. The Machine is self-contained in a massive iron frame of specially deep section securely bolted together with machined joggled faces which ensure absolutely true joints and prevents possibility of shifting under stress with consequent variation in weighing.

The levers are of cast iron and are suspended from the framework. The rockers are of steel castings and are fitted with hardened steel bearing blocks for supporting the fulcra knife edges of the main levers. The knife edges and bearings are of specially made highest quality steel and are accurately lapped to gauge

after hardening. The main knives are rigidly fixed into machined recesses and are interchangeable.

The rails are supported on steel girders which swing in the direction of the traffic. The metal portion of the platform can be removed without unbolting the rails and this gives access to the underwork and allows light and ventilation in the pit.

The most usual capacity is 40 tons but it can be made up to 100 tons for weighing Bogie Wagons. If required it can be graduated in both English and Indian standards. These machines are most suitable for weighing complete trains of coal trucks in Collieries, Jute Mills, Power Stations, etc., etc.

Now in use on the following Railways :—

Great Indian Peninsular Railway, Bombay-Baroda and Central India Railways, East Indian Railway, Eastern Bengal Railway, Ceylon Government Railway, Madras & Southern Mahratta Railways, Assam Railways and Trading Co., Ltd., Oudh & Rohilkund Railway, Commissioners for the Port of Calcutta, Sutlej Valley Canal Project, Tientsing Pukow Railway, Shangai Nanking Railway, etc., etc.

Stall No. 48.

The Krishna Tap Works, 16, Ram Mohan Mukherjee Lane, Sibpur, Howrah.

The firm are exhibiting their "Krishna Waste Preserving Tap".

Stall No. 50.

MESSRS. B. D. BERRY & Co. (43, Ripon Street, Calcutta) are exhibiting Bery's Automatic Oil Engines,

Bery's improved type automatic all iron handloom, Bery's warping machine and their other specialities.

Stall No. 76.

THE MIRRLESS WATSON CO., LTD.,

(INCORPORATED IN SCOTLAND),

11, Clive Street, Calcutta.

Manufacturers of :—

Sugar Machinery Condensing Plants.
Water Distilling Plants.
Oil Mill Plants.
Evaporators.
High Vacuum Extraction Pumps (for Condensers).
High-Lift Turbine Pumps, Ejector Air Pumps and Crushing Plants of all descriptions.

The Mirrless Watson Co., Ltd., manufacture two types of Ejector Air Pump—the Simple type and Intermediate Condenser type. The former dispenses with the use of an intermediate condenser but requires about double the amount of operating steam. There are many cases where this is not a disadvantage, namely, where it is possible to utilise the greater quantity for heating the feed water.

The Intermediate Condenser type is made with two compression ratios, *viz.* :—"A" Compression which uses 17% of the operating steam in the first stage and 83% in the second stage, and "B" Compression using about 50% in each stage when working at full load.

The Mirrless Ejector Air Pump is the most stable, gives highest vacuum efficiency and *uses less steam than any ejector made.*

The Mirrless Watson Company have supplied these Ejector Air Pumps for turbine installations up to 20,000 K. W. in one unit, equivalent to a condenser steam duty of 210,000 lbs. per hour. They are in world-wide use serving condensers with a total duty of over 7,000,000 lbs. of steam per hour.

Mirrless High-Lift Turbine Pumps are manufactured in two distinct forms—the Ring type and the Barrel Casing type. The former may consist of any number of stages, from one upwards as required, by adding duplicate parts and increasing the length of the shaft and tie-bolts. In the Barrel Casing type the casing does not sustain any hydraulic pressure or other strain when the Pump is working. As no water comes in contact with the barrel casing, *no joints are* required and the internal parts cannot rust in.

Mirrless High-Lift Pumps are recommended for Mines Pumping, Draining and Shaft-sinking, Waterworks, Industrial Concerns, Ship and Dock Hydraulic Gear, Capstans, Petroleum Refineries, Chemical Works, Boiler Feeding, Fountain Supply, etc., etc.

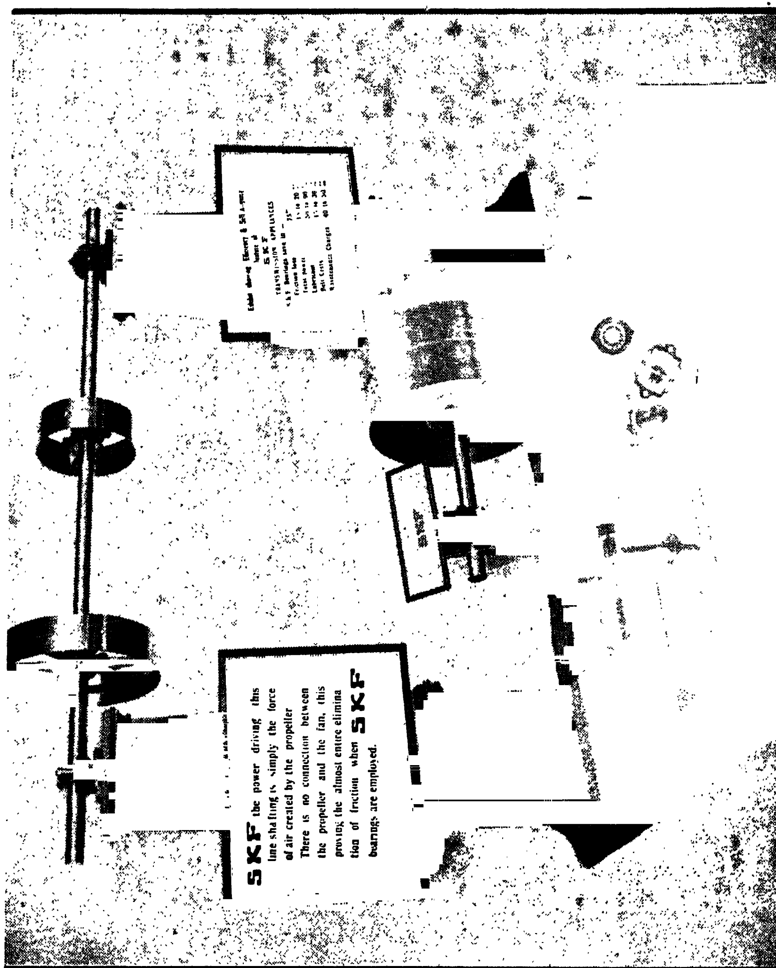
Stall No. 77.

SKEFKO BALL BEARING CO., LTD.,

5, Bank Street, Bombay.

On this stand is exhibited a variety of types and sizes of Ball-bearings as used on motor cars and all

classes of machinery. Transmission Units, such as Ball-bearing plummer blocks, four-way adjustable



Hangers, etc., are also shown, these in all cases being fitted with the SKF Patent double-row self-aligning Ball-bearings. By virtue of this feature of self-alignment, these Transmission Units will operate

successfully even when mounted on a bent or badly aligned shaft, for the ball-bearing is self-aligning within itself, the outer race being free to revolve in a different plane from the inner one without the slightest trace of rubbing friction being set up.

The interesting working model demonstrates the almost entirely frictionless operation of the bearing—a length of 2½″ diameter shafting, complete with pulleys and driving a countershaft, being operated by no other motive power than the wind from a very small motor-driven propellor acting against the blades of a fan.

Another interesting Unit is the SKF Patent Split Belt Pulley. The design of this Pulley is altogether unique, combining as it does, excessive lightness with the maximum of rigidity and power-transmitting capacity. Loose Pulleys of this design are shown fitted with Ball-bearings. The SKF Patent Pulley is exceptionally well-suited for high speed work because of the extreme accuracy of balance.

Stall No. 78.

JAMES MURRAY & CO.,

12, Government Place, E., Calcutta.

High Class Engineering, Surveying and Mining Instruments. Drawing Instruments and Materials, Nautical Instruments, Scientific Instruments including Microscopes suitable for Tea Gardens, Collieries, Engineering, Laboratories, etc., etc.

Surveying and Mining Instruments manufactured by Messrs. E. R. Watts & Son, London.

These high class instruments should be of special interest to all Engineers, Surveyors, P. W. D. Officers, etc., as many of them are of entirely new design embodying some of the greatest advances of recent years in the design and construction of Theodolites and Levels, resulting in greater accuracy, more convenience and speed in operation and less bulky proportions.

With regard to Theodolites—the following are, perhaps, the principal improvements :—

(1) Verniers, instead of bearing on the top edge of the Horizontal circle are now read on its inner edge, with a consequent reduction of friction and a smoothness of rotation hitherto unknown.

(2) In addition to the main axis, the Horizontal (and sometimes the vertical) circle is entirely enclosed in a dust and waterproof box. By this means vital parts of the instrument are kept clean and accuracy is maintained.

(3) The upper and lower parts of the instrument are not detachable from each other. This saves a great deal of time in getting the instrument out of its case and setting it up on its stand. It is more compact and there is also less risk of the instrument getting damaged.

(4) The telescope, in many of the instruments, has internal focussing. The advantages of this important device are now fairly well-known and are fully described in Messrs. E. R. Watts & Co.'s catalogue.

The above improvements were originally introduced by Messrs. E. R. Watts & Son, in 1913 and have since been adopted by most of the other Surveying Instrument manufacturers.

With regard to Levels—The modern requirements of Hydro-Electric schemes, Irrigation works, etc., are

often so severe that the old type of Level, in which accuracy, of the result depended, amongst other factors, on the concentricity and rigidity of the axis, has been largely replaced by a type of instrument in which the relation of the bubble to the optical axis, is the only deciding factor in the precision of the observation. This, which may be termed a "one adjustment" level is shown in several of their latest instruments such as the Zeiss pattern Level, P. W. D. Precise Level, etc. For each observation of the staff through the telescope, the main bubble is brought to the centre of its run by means of a finely threaded elevating screw, and on the accuracy with which this can be done, largely depends the final result. In this connection we may mention the Zeiss Prismatic Bubble reading device by which a view of each end of the bubble is compared at the same time and is a particularly easy and accurate method of adjustment. Also the constant bubble which remains of constant length under considerable changes of temperature. With this latter device it is only necessary to observe one end of the bubble by means of a reflecting bubble.

Drawing Instruments :—

Messrs. James Murray & Co., are also exhibiting a very fine series of drawing instruments, of entirely new design, which have many advantages over the older types. Previously it was the practice among British Drawing Instrument manufacturers, to file up the limbs and other parts of the instruments by hand from castings : this made the instruments needlessly cumbersome while the cast metal was naturally brittle and liable to flaws. In these new instruments all castings

are done away with, a special hard rolled Electrum alloy being employed, which enables the instruments to be made much lighter and neater in design, combined with greater strength while the finish is in every way superior. Further all parts of the instruments are standardised, enabling any portion lost or broken to be easily replaced, and last but not least, owing to the system of mass production employed in their construction, their price works out at about half that of the best quality old pattern instruments.

Among the many novel improvements embodied in their construction we may mention the following outstanding features, which in our opinion should prove of very great convenience to draughtsmen.

(1) The special standardised self-centering parallel attachment.

This device is fitted to the heads of the compasses and dividers and ensures the legs always opening equally, thus keeping the handle of the instrument true and perpendicular to the surface of the work.

(2) Reversible Screwed shoulder needle.

In ordinary Drawing instruments the practice is to utilise an ordinary sewing needle with the head removed for the needle point, and the result is that unless it is made a dead fit in the socket, it develops a shake which causes inaccurate work, and if unfortunately broken, is sometimes very difficult to extract. In these new instruments, the needles are very much thicker and provided with a shoulder point which prevents large holes being made in the paper, thus ensuring greater accuracy and neatness, while the screwed shank allows the projection of the needle to be adjusted to a nicety.

(3) Swivel joint pen points.

All draughtsmen know what a nuisance it is when the ink dries up and becomes clogged between the blades of the pen and much valuable time is lost in removing it. To obviate this the usual custom was to provide the pen with a hinged top nib so that the blades could be opened. This was found much more convenient but unfortunately it was necessary to remove the adjusting screw for this purpose with the consequent difficulty in setting the pen to the same width of line again. With the new swivel nib this difficulty is entirely overcome. A push sideways with the thumb opens the pen for cleaning after which another push in the reverse direction and the pen is ready for action again without disturbing the setting in any way.

(4) Rotating Spring Bow.

The special feature of this is that the body of the instrument rotates freely on the fixed steel centre rod, thus in describing circles the needle point remains stationary. This is a great advantage when making small circles as there is no danger of the needle point jumping out of the paper and spoiling the work, as sometimes happens when using the old pattern Spring Bow.

The instruments are supplied in various qualities to suit all requirements, from the student to the expert draughtsman, and can be purchased separately or made up in sets of practically any size, the latter being put up in neat and serviceable velvet lined cases.

Messrs. Murray & Co., are the sole agents for these instruments for the whole British India, Burma and Ceylon.

In addition to the above specialties Messrs. James Murray & Co., are exhibiting a series of Microscope outfits manufactured by Messrs. W. Watson & Sons, for whom they are the agents, and also various Scientific, Mathematical and Nautical instruments.

Stall No. 82.

THE VACUUM OIL CO., 2, Clive Row, Calcutta.

The Vacuum Oil Company, who have an attractive exhibit of some of their products at Stall No. 82, are the Pioneers of mineral oil lubrication, the Company having been founded in 1866, and to-day they claim to be the leaders in this important branch of Mechanical Engineering both as regards technical knowledge and the quality of their products. This latter claim is based on the fact that their products are manufactured as direct products from specially selected crudes and are not like most other lubricating oils on the market the mere by-products after extraction of the greatest gallonage of petrol and kerosene. The Company takes its name from the vacuum process of manufacture in which a lesser degree of heat is required for distillation, thereby retaining the full lubricating value of the oil.

Their motto "A grade for every type of service" is fully realised by a perusal of their price-list and their products are recommended by the most eminent builders of all classes of machinery. They are perhaps best known to the public as the manufacturers of Gargoyle Mobiloil for motor lubrication and for their Chart of Recommendations, the 1923 edition of which has received the approval of 465 automotive manufacturers.

They also claim to sell more motor lubricants in India than all the other oil companies combined.

Stall No. 84.

MESSRS. INGERSOL RAND (INDIA) LTD.,

6, Council House Street.

The exhibits of this firm consist of machinery and tools especially fitted to meet the needs of the mining industry, air compressors for petrol or electric drive, pneumatic riveters, chippers, drills, &c., Calyx Boring machines, Ingersol compressed air machinery and boring machines.

Stall No. 85.

MESSRS. W. H. HARTON & CO.

(8 & 9, Canning Street, Calcutta).

are exhibiting Manila and coir ropes of various sizes which they manufacture in their factory at Bhusri as an archway of ropes.

The mainpiece is of 48″ circumference coir hauser, which together with the one made by them for the Paris Exhibition in 1900 are claimed to be the two largest ropes ever made in the world.

Stall No. 1.

JESSOP & CO., LTD.

Messrs. JESSOP & Co., Ltd., have a large and varied exhibition of machinery, most of which will be shown running.

The following is a description of the principal exhibits :—

Jessop's "Phœnix" Hydraulic Press.—The "Phœnix" Press which is sometimes known as "Roddick Patent Press" is designed and manufactured in India and represents a type which for many years has been used extensively for pressing Kutcha Jute Bales, Hides, and for pressing Hay and Fodder. In the Jute baling districts of Narayanganj, Chandpur and elsewhere a large number of these Presses have been at work for many years and their number is constantly increasing. Large numbers have also been supplied to Government for Hay and Bhoosa for mule transport.

The outstanding feature of the design is the extreme simplicity in construction and working. The Press requires practically no foundations and can readily be dismantled and moved from place to place when occasion requires and can be worked by unskilled labour. The exhibit shows one type of "Phœnix" Hydraulic Pump with 4 Rams, mounted on a substantial Cast Iron Bed Plate and wheeled truck to facilitate transport. Several other forms of Pumps can also be offered more suitable for fixed installation and if desired hand-operated Hydraulic Pumps can also be supplied.

When used for pressing Jute, the Presses are designed to make 3½ or 4 maunds bales of 48 × 20 × 18 inches size. When used for as a Fodder Press, one maund bales of Hay or Bhoosa can be pressed to 24 × 8 × 12 inches.

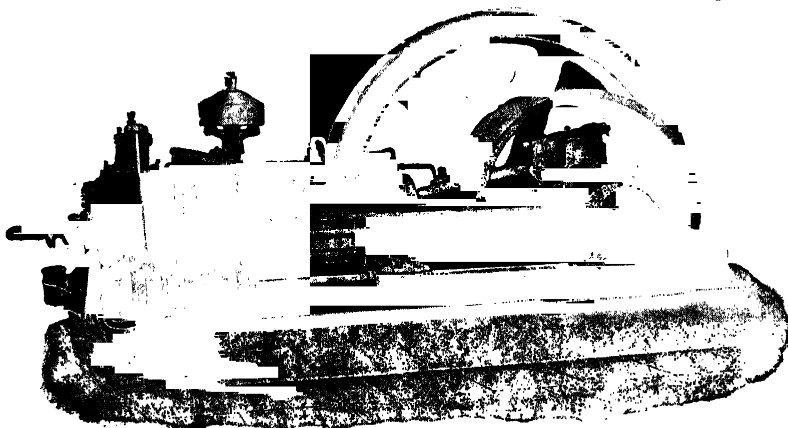
For portable installations, as required on Military Farms, it is usual to drive the pump by a 6 N.H.P.

Portable Steam Engine, but for fixed installations it is generally more economical to use a modern Tangyes Crude Oil Engine working on Crude or Residual Oil. The exhibit shows the Hydraulic Pump worked by belt from the power provided on the Stand and all the operations of pressing can be noted.

Colliery Equipment.—Adjacent to the Baling Press described above, is an interesting model showing a complete Pit Head equipment comprising a Double Cylinder Winding Engine of the type made by Messrs. Jessop & Co., Ltd., in their Howrah Works, together with a model Pit Head Frame equipped down to such small items as safety hooks. Alongside of the Sectional model will be seen a Cochran Patent Multitubular Vertical Boiler, a type which is a considerable improvement both from the point of view of superior construction and economy in working when compared with the ordinary Cross Tube Vertical Boiler which is still such a common feature in Colliery districts. The model shows how accessible the Cochran Boiler is for the purpose of cleaning and the large increase in heating surface and consequent increase in efficiency which is obtainable with Boilers of this type.

Tangyes Oil and Gas Engine.—Running exhibits of a number of sizes of Oil Engines occupy a large part of the western end of the Stand. Of these the principal exhibit consists of one of Tangye's "All-Fuel Quick-Change" Heavy Oil Engines, the first we believe of its type to be seen in India. The Engine is of 50B.H.P. and is designed for working either on low grade Residual Oil or on Town or Suction Gas. The actual conversion from the one type to the other is capable of being made in less than half an hour.

The advantage of this type of Engine is that the user can adopt whichever class of fuel happens to be cheapest at any time, or on the other hand he may obtain the full advantage of working his factory on



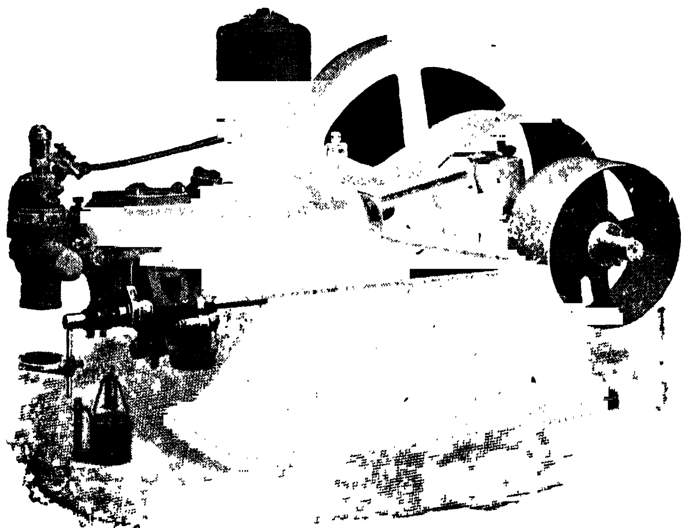
Tangye "All-Fuel Quick-Change" Engine.

Suction Gas made from waste products even though sufficient waste material is not available to keep the plant running continuously. As buyers of Oil Engines are frequently concerned about the uncertainty of liquid fuel prices in years to come, an Engine which gives them an alternative which can be adopted at any time is well worth an extra 10 or 15 per cent. on the initial cost. It should be mentioned that the cost of converting an Oil Engine to a Gas Engine is generally considered to be prohibitive, as it amounts to one-third to one-half of the value of the Engine, but Messrs. Tangyes Ltd., design special convertible Engines which, if ordered in the first place, will obviate the heavy outlay indicated if, later on, it is desired to make an alteration.

Alongside of the Engine will be seen one of

Tangyes latest design of Suction Gas Producers capable of working on non-caking Bituminous Coal, Wood and Saw Mill refuse, Paddy husks, spent tan, cocoanut shells and a large variety of other waste materials. During the time of the Exhibition facilities will be given should any *bona fide* enquirer wish to have a test made on any waste product which he desires to use for power purposes.

A small Tangyes Heavy Oil Engine of the Cold Starting Type developing 18B.H.P. is also shown on



the Department of Industries Stand opposite to Messrs. Jessop & Co.'s near the main entrance. It will be noted that none of the Engines shown are using water tanks for cooling purposes, but that one Mechanical Cooler of the Heenan type is being used. This occupies a very little space and will cool the circulating water and maintain practically constant tempera-

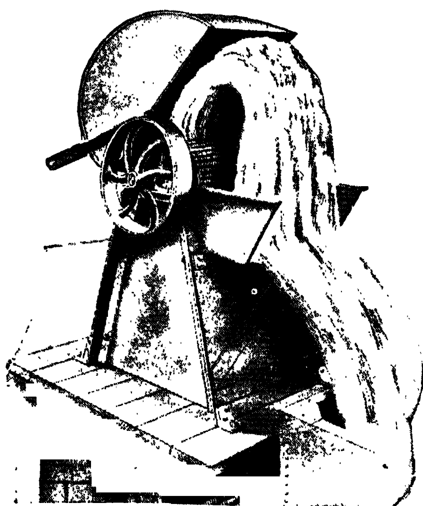
ture irrespective of the number of hours which the Engines have to work.

Other Oil Engines on this Stand include three of the well-known "AA" Type, Tangyes Oil Engines, one being of the General Purpose type, Deep Base design, one of the Electric Lighting type suitable for driving a 5 to 6 K. W. Dynamo and a small Engine with Air Compressor attached, which is used for charging the Air Receiver of the large Engine.

Ransomes, Sims & Jefferies, Ltd., "Wizard" Oil Engines.—Another interesting exhibit comprises three "Wizard" Oil Engines a new type made by Messrs. Ransomes, Sims & Jefferies, Ltd., the well-known Engineers of Ipswich. The chief feature of these Engines, which are of Two-Stroke design, is that the use of either Magneto or Heating Lamps for starting or when running is obviated. The Engines are in fact *cold starting* and are designed to work on the lowest grades of Kerosene Oil. One of these Engines is shown mounted on a truck and driving a Centrifugal Pump, the whole forming a compact and easily portable unit and one which shows remarkable steadiness in running.

Pumping Section.—A section of the Stand is devoted to various types of Pumps such as are commonly used in India, including a Tangyes Vertical Treble Ram Pump of the type frequently used for Tube Well Pumping. These are grouped round an open tank on the Stand so that their working can be observed. A small motor-driven Centrifugal Pump specially designed for domestic water supplies is of special interest, as both the pump and its design are a Jessop's production.

"Aquatole" Water Lifts.—On a platform over a tank on the Stand a novel form of Pump known as "Aquatole Water Lift" is shown working. This type





"Aquatole" Water Lift.

of pump is a comparatively new invention and has only been on the market for a few years during which time

it has established its claim to be the simplest and one of the most economical type of Pumps for irrigation and work of a similar character.

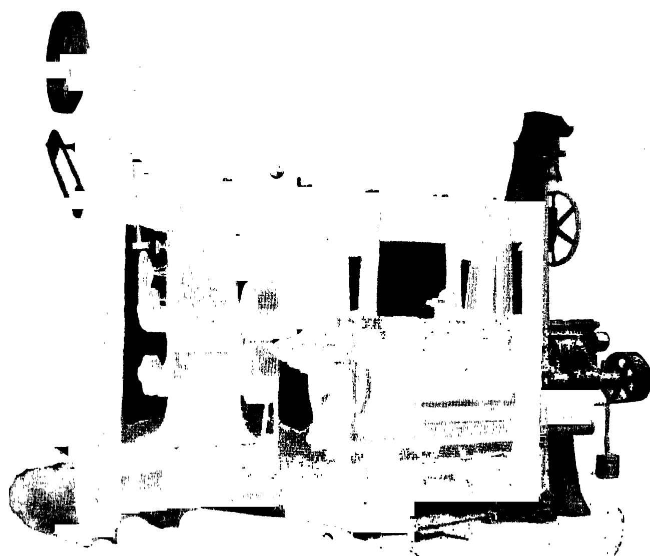
The distinguishing feature of the Pump is the fact that it has no Valves, Pump Levers, Buckets or Rods. It consists of two pulleys, one in the pump head and the other submerged in the liquid which it is required to pump, the latter pulley is suspended from the former by means of a flexible woven Wire Belt. When the uppermost pulley is revolved the belt travels with it and the rising side takes up films of water which are thrown off and discharged by centrifugal force as the belt passes over the uppermost pulley. This principle has been found to be remarkably efficient, even when applied to wells of over 100 ft. in depth, and the advantage of having a pump which requires no alteration to any well to which it is applied, and no fixing below ground level will be apparent to anybody who has considered the difficult problem of Deep Well Pumping. There are numerous other applications of the Aquatole Pump which will occur to those who are interested in pumping problems.

Electrical Exhibits.—A section of the Stand is devoted to various Electrical appliances and includes a small Electolite Direct Coupled Generating Set of 1½ K. W. capacity, a 5 K. W. Lancashire Dynamo and Motor Co.'s Generator driven by belt from Tangyes Oil Engine and an interesting exhibit is a set of winding and control gear made by Messrs. Smith Major and Stevens of Northampton for one of their Standard Lifts: The latter will be shown in operation to enable those interested to inspect in detail the various special features which go to make the reputation for sound

design combined with every possible consideration affecting safety which are the characteristics of the Lifts turned out by Messrs. Smith Major & Stevens Limited.

Electric Coal Cutter.—An exhibit of exceptional interest to Bengal Collieries at the present moment is the Chain Type Electric Coal Cutter of the Diamond Coal Cutter Co.'s make. An expert will be in attendance to explain the special features and method of working this machine.

Oil Mill Machinery.—The exhibits of modern oil extracting machinery which form another section of



...... Oil Expeller.

this Stand will be of special interest in a country such as India in which oil seeds are very largely grown and in which so much oil is consumed.

The methods most usually adopted for the expression of oil from seed in India are susceptible to considerable improvement but the exhibit is designed not to show the type of machinery which would be used in very large oil mills so much as the simpler machines which can readily be added to existing mills at present operating on the old methods. The exhibit comprises a set of Seed Crushing Rollers, an Oil Expeller and a Filter Press, all made by Messrs. Smulders, Ltd., the well-known specialists in Oil Mill Machinery.

The Expeller system of Oil extraction is particularly suited to most Indian Oil Mill requirements, as the cost is moderate compared with that of large and complicated mills on the Hydraulic system while the results obtained in yield of oil are far better than those regularly obtainable in small country mills. The use of the Expeller system of oil extraction has developed considerably during recent years, especially on the western side of India and its larger adoption in Bengal and other places is regarded as only a matter of time.

It should be mentioned that where larger and more expensive mills are required for operating on a considerable scale, Messrs. Smulders, Ltd., can supply modern plant to treat any kind of seed.

Stall No. 21.

MESSRS. FAIRBAIRN LAWSON COMBE BARBOUR (INDIA) LTD.

Sarsatelli, District Burdwan, and 24, Strand Road, Calcutta.

Exhibit Examples of their Castings in Iron and Steel and also finished parts of Jute and various Machinery, to show part of their range of work and customary finish. Also exhibited is a Single Head Double Threaded Screw Drawing Frame, with a new patented reception motion, which is designed to allow the same speeds to be obtained as on the existing Push Bar Machines, with the added advantage of better Pinning and longer Drafts being obtainable.

Every Machinery part exhibited on this Stand, is exclusively made in India, by Indian Workmen, under European supervision.

Stall No. 34.

CROSSLEY BROS. LTD.

"COE" TYPE CONVERTIBLE GAS OR OIL ENGINE.

Developing working loads of

31 BHP. on Refined, Crude and Residual Oils
31 BHP. on Town's Gas or Natural Gas
25 BHP. on Producer Gas

This type of engine has been designed to meet the requirements of manufacturers, who may have a limited supply of refuse fuel, but insufficient for all-the-year-round running.

When the supply of fuel is exhausted the engine can be easily converted within half an hour to a COLD Starting Crude Oil Engine operating on exactly the same principle, and with the same efficiency as the standard model.

Refined, Crude and most of the Residual Oil give satisfactory results when used with the engine operating as an Oil Engine.

Suction Gas suitable for the engine can be generated from coal, coke, waste wood, saw dust, shavings, cocoanut shells, rice husks, tea prunnings and numerous other types of vegetable refuse.

S1075 SUCTION GAS ENGINE & SUCTION GAS PLANT.

Developing a working load of

6 BHP. using Charcoal as fuel
5½ BHP. ,, Coke ,, ,,

In connection with this engine a Charcoal Maker is shown of a capacity sufficient to prepare charcoal from wood for the running of the engine on full load.

This unit is designed to meet the requirements of small power users in the Mofussil where charcoal or waste wood is available and can be obtained at a much cheaper rate than can kerosene oil.

G1085 TOWN'S GAS ENGINE.

The power developed by the engine is 4¼ BHP. when using as fuel Gas in the Town's Mains. (Supplied in Calcutta by Messrs. The Oriental Gas Co.)

The special feature of this engine is its simplicity and economy whilst running.

PP1065 KEROSENE ENGINE & CENTRIFUGAL PUMP.

A Portable Pumping set mounted on a trolley designed for Agriculturists and Irrigation Works.

The power developed by the engine is 4½ BHP. and is capable of lifting 200 gallons of water per minute through a head of 20 ft.

Stall No. 2.

INDUSTRIES DEPARTMENT.

THE CALCUTTA RESEARCH TANNERY.

ITS OBJECTS, ACTIVITIES AND EXHIBITS.

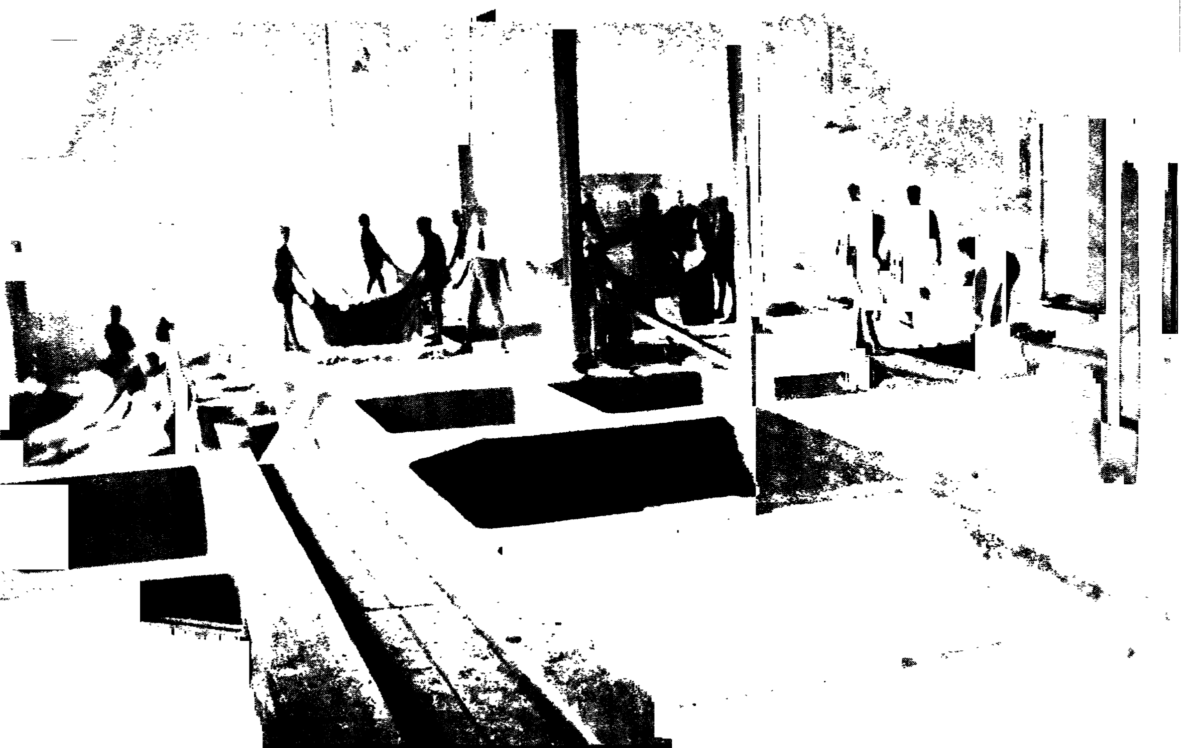
Possibilities of tanning in India :—

Tanning is one of those industries which should be capable of ample development in India. The resources of the country in the necessary raw materials are abundant, but in the absence of an organised industry most of the available raw materials are exported abroad.

2. The export of raw hides and skins from India has been going on for quite a long time. Export figures are available from the year 1862. Till the last war this export trade had been steadily on the increase both in volume and value, as can be judged from the figures below :—

Export for period.	Raw hides and skins (quantity in Cwts)	Value per Cwt. Rs.	A.	P.	Total value of the export (in thousand rupees).
1880-85	666,417	37	6	3	2,34,15
1910-15	1,473,823	67	5	11	9,92,97

3. The United Kingdom, the continental countries of Europe and the United States of America all participated in this export trade. In the early years the



Demonstration Tannery. View Inside.

bulk of the hides went to the United Kingdom and only a small portion to the continent. But later on matters were reversed Germany and Austria taking about 57% of the total export of cow hides and U. S. A. about 72% of the goat skins. This change was due to the development of chrome tanning in Germany and in the United States of America. The German tanners utilised Indian cow hides for the production of chrome and vegetable upper leathers and in the United States that well-known fine leather, glace kid, is made from the Indian, specially the Bengal goat skins. This growing demand for Indian hides and skins is an unmistakable proof of their suitability for the production of commercial leather from them. In fact Indian hides and skins play a very important role in the economics of the world's leather trade.

4. As regards tanning materials, the principal raw product of the country for export is the myrabolans. Besides these, there are various other useful tanstuffs in the forests of India, which if commercially exploited, would prove to be of immense utility not only to the tanners of India, but also to those of other countries. Chromite ore is available in India in commercial quantity and from this chrome salts can be manufactured for chrome tanning. Indian chromite is now exported. There are various vegetable dyes (red, yellow and brown) in the country which could be satisfactorily utilised for dyeing leather.

Tanning a neglected art in India :—

5. Though the art of tanning appears to have been practised in India from a very early time it never

reached a high stage of development in the country. The cause may be attributed to the fact that capital and intellect were never brought to bear on this art.

6. Handling of animal products such as hides and skins is considered unclean by the Hindus and hence the industry was left in the hands of a depressed class of the society known as *Chamars*. The *chamars* had been, as they still are, quite illiterate and all their technical skill in the art consisted in what had been taught to them by their forefathers. The same crude technique was thus handed down from generation to generation.

7. Being denied the light of education and the lead of their educated countrymen, the *chamars* could not utilise the improvements which modern science has conferred upon the art of leather-making. In Bengal, only a few years ago, the tanning industry consisted of a few crude tanning yards in the neighbourhood of Calcutta and a few huts in some of the villages of the Province. In Calcutta, the tanneries were owned by a few Mahomedan proprietors, but the entire technical part was left in the hands of the *chamar* mistries. In the villages, the tanning was pursued by the *chamars* in their cottages as subsidiary to their agricultural work.

8. The *chamars* however did not get much patronage from the public. Leather did not enter into the simple outfit of the rural Indian in any appreciable quantity. The village *chamars* eventually found that agriculture was more profitable to them than tanning, and a great majority specially in Bengal, gave up tanning altogether and turned to agriculture.

9. Since the spread of English education, and the migration of the people from the villages to towns, the

demand for shoes and other leather goods has become perceptible and it has not only tended towards an increased volume but also to a better quality.

10. Now there is an appreciable demand for superior leather goods (shoes, travelling requisites, saddlery, upholstery leather, leather belting, etc.) in the country and sufficient room has therefore been created for the growth of a modern tanning industry in India.

Introduction of modern processes of tanning in Bengal :—

11. The condition of the leather industry in the province was as indicated above deplorable. The modern processes of tanning were practically unknown. Hap-hazard attempts were made by a few enthusiasts to introduce them but with no great commercial success. The causes of failure were various, the most outstanding among them being (1) lack of expert knowledge, (2) the tropical climatic conditions and (3) lack of capital.

12. The need of a modern tanning industry in the country for the conversion of the local raw materials into leather suitable to modern requirements, civil and military, was most keenly felt during the last war. It then became necessary to devise ways and means to develop the tanning industry in the province.

13. The very nature of the art of tanning demands that improved processes should be worked out by local research under local climatic conditions. A mere transplantation of western methods will not prove successful under the conditions that obtain in this country.

Establishment of the Calcutta Research Tannery.

14. With a view to carrying out the researches to foster the growth of the tanning industry in the province the Calcutta Research Tannery was established by the Government of Bengal in the year 1919.

Equipment of the Institute.

15. The Institute consists of (1) a laboratory and (2) a demonstration tannery.

The laboratory is fitted with up-to-date apparatus for the conduct of research and analytical work in connection with the applied chemistry of leather manufacture and the demonstration tannery is installed with a set of chrome and vegetable tanning machinery and vats. Tanning on a semi-commercial scale is conducted in the tannery.

The plates I to IV show the different departments of the Calcutta Research Tannery.

Activities of the Calcutta Research Tannery :—

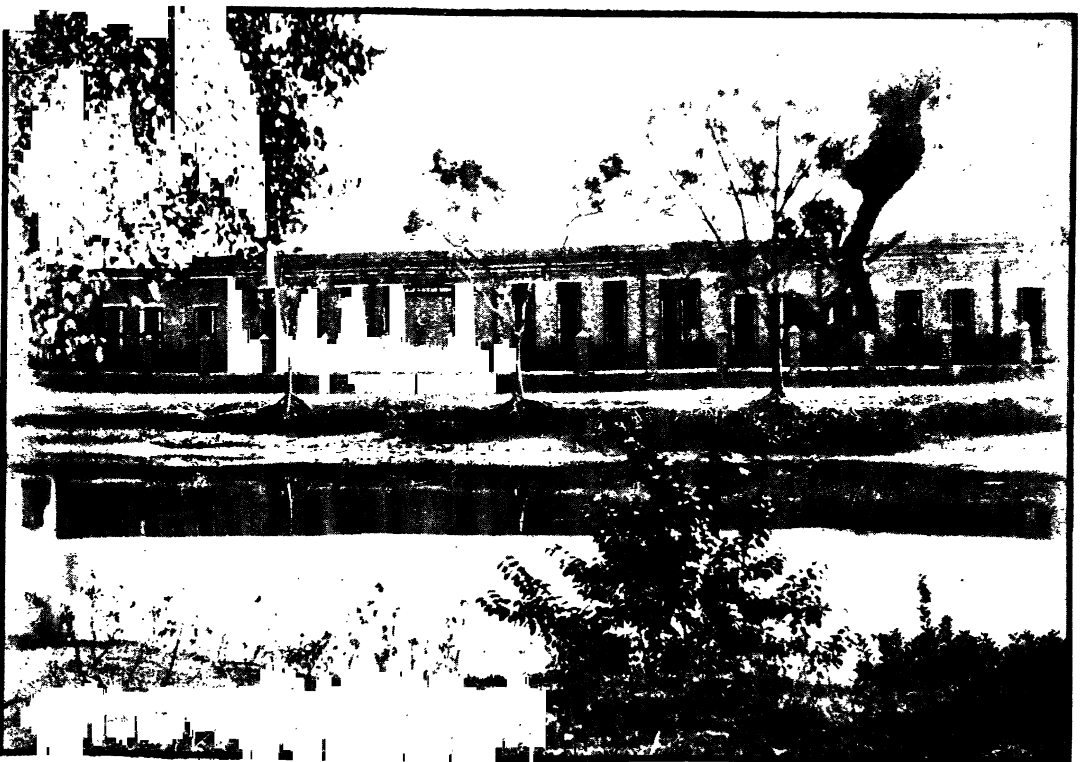
16. Activities of the Calcutta Research Tannery may be divided under the following three heads :—

(*a*) Investigations on raw materials and tanning methods.
(*b*) Training of apprentices.
(*c*) Assistance to the tanning trade.

(*a*) *Investigation* :—

17 The forests of India are teeming with many useful tanning materials of which very few are known or commercially used.

18. Mr. J. A. Pilgrim, the late Tanning Expert to the Government of India, discovered in the Sunderbans and other Forest Divisions of India many



Research Tannery Laboratory Building.



Balance Room Research Tannery.

tanning materials which were not known before. Some of the recommended materials have been collected in bulk and practical tanning experiments have been made with them at the Calcutta Research Tannery. Samples of some of these tanstuffs and leathers tanned with them are exhibited on the Calcutta Research Tannery Stall.

19. Commercial standards of strength of local tanning materials not having been fixed, tanners and extract manufacturers are always in the dark as to the tanstuffs they purchase. Investigation of local tanstuffs with a view to fixing their commercial strengths and to finding out the most economic methods of their utilisation have therefore been undertaken at the Calcutta Research Tannery. Much work has already been done in this connection. The best economic methods of utilisation of two important tanstuffs of the Sunderban Forest Division have been worked out and the report published for the benefit of the trade.

20. Practical tanning experiments have been made, at the demonstration tannery, in the manufacture of sole leather of superior quality from local buffalo hides and local tanning materials. The results achieved are quite satisfactory, and a process has been worked out which is likely to be of great benefit to the local tanning industry.

Chrome tanning :—

21. The manufacture of box sides from cow hides by the chrome process has made some progress in the province, and several tanneries in Bengal are engaged in this branch of leather industry. But the products

of nearly all of them suffer from a common defect *viz.* looseness of grain. The defect, though it may be attributed to a certain extent to the quality of hides, is also due to defective processes followed in their treatment. Investigations were started at the Calcutta Research Tannery to find out the causes of the defect and to work out methods of improvement. Results so far achieved have thrown considerable light on the subject and it has been possible to effect material improvement in the quality.

22. Most of the local tanneries use slaughtered hides for the manufacture of box sides. But the supply of this class of hides is very limited. Experiments were therefore, started at the Research Tannery with different qualities of dry-salted hides which form the bulk of local cow hide supply.

A few experiments have been made with Dacca, Rungpore and Chittagong hides. Further experiments are in progress.

Manufacture of glace kid from goat skins by the chrome process :—

23. The manufacture of glace kid is the most important branch of American leather industry. The American tanners enjoy a monopoly in this because they have raised the art of glace kid making to a very high standard. For this monopoly they depend largely on Indian goat skin and from years of experience they have found that the goat skins of Bengal produce the finest grade of glace kid leather. It is only natural that attempts should be made to develop the glace kid industry in Bengal which is recognised to be the home of best grades of goat skins.

24. Investigations have therefore been undertaken to work out suitable methods for manufacturing this variety of fine leather. The experiments conducted have solved many preliminary difficulties and a process has been worked out to produce a leather which compares very favourably with the American make.

Training of Apprentices :—

25. There is at present accommodation for the training of 20 apprentices at a time. Eight apprentices have already been trained and six of them provided with suitable jobs in the trade.

Assistance to the Trade :—

26. There are many small cottage tanners in the neighbourhood of Calcutta who, having no machinery installation at their tannery, cannot finish their own products. They are by no means few in number. To help them all machine work involved in finishing their products is undertaken at the Calcutta Research Tannery at commercial rates. Analytical work for testing the purity and strength of tanners' chemicals is also done at the laboratory on a commercial basis.

Reasonable fees are charged for such work. The schedule of charges and prices of the tannery products may be had on application to the Superintendent, Calcutta Research Tannery, Pagladanga, P.O. Entally, Calcutta.

Muffasil Demonstrations :—

27. The muffasil tanners are still ignorant of the improvements effected in their trade by the application of modern science to the industry. To teach the

muffasil tanners the modern scientific methods of tanning there is a peripatetic demonstration staff, and practical tanning demonstrations are held at suitable places. A practical Tanning Demonstration has been arranged for this Exhibition.

Publications :—

28. Reports of the investigations and monthly and quarterly reports of work done, are printed and distributed for the benefit of the trade. Besides the reports some bulletins have been published. The following is the list of the publications.

(1) Hand Book of Tanning.

(2) চর্ম্ম শিল্প।

(3) মৃত পশুদেহ হইতে চামড়া ছাড়ান ও তাহার সংরক্ষণ।

(4) Report on the investigation on the Indian Tannery waters.

(5) Small Tannery Schemes.

I. LEATHERS :—

29. The following is the complete list of leather and leather goods exhibited by the Calcutta Research Tannery :—

I. LEATHER :—

Chrome Leather :—

From cow hides :—

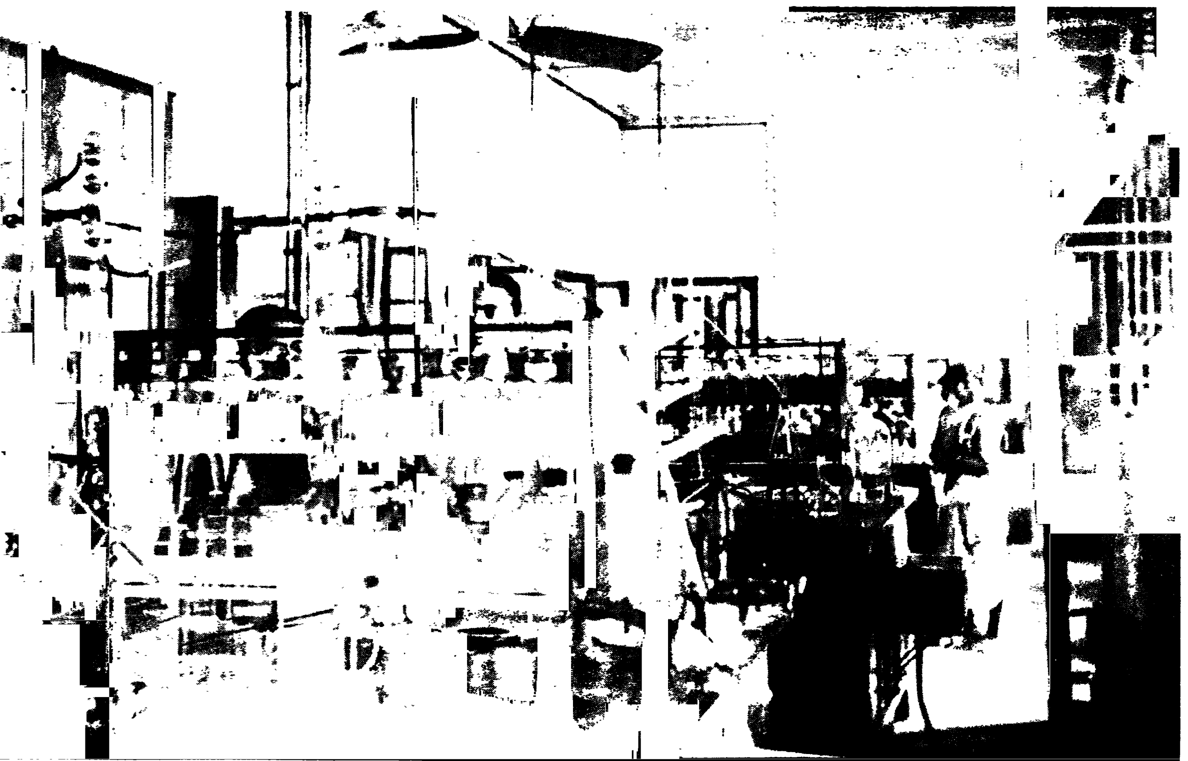
(1) Black Box sides.

(2) Brown ,, ,, (light and dark brown).

From goat skins :—

(3) Black glace kid.

(4) Brown ,, ,,



General Laboratory—Research Tannery.

From buffalo hides :—

(5) Chrome sole (waxed).

(6) ,, ,, (unwaxed).

(7) ,, Picking band.

(8) ,, Belting.

Vegetable tanned leather :—

From cow hides :—

(9) Leathers for bags and suit cases.

From goat skins :—

(10) Black Morocco.

(11) Red ,,

(12) Green ,,

From sheep skins :—

(13) "Suede" in various shades.

(14) Book binding leather in various shades.

Formaldehyde leather :—

(15) Sheep skins (white).

Oil tanned leather :—

(16) Chamois leather.

II. LEATHER GOODS :—

(17) Suit and attaché cases.

(18) Hand bags, purses, etc.

III. VEGETABLE TANSTUFFS COLLECTED FROM DIFFERENT PARTS OF INDIA.

Local tanstuffs :—

(1) Babul bark (Acacia Arabica).

(2) Myrabolan (Terminalia Chebula).

Sunderban tanstuffs :—

(3) Goran bark (ceriops Roxburghiana).

(4) Sundri bark (Heritiera Minor).
(5) Sundri leaves (Heritiera Minor).
(6) Golpatta leaves (Nipa Fruticans).
(7) Pussur bark (Carapa Moluccensis).
(8) Dhundul bark (Carapa obovata).
(9) Kankra bark (Bruguiera gymnorrhiza).
(10) Gurjan bark (Rhizophora mucronata).
(11) Gurjan fruit (Rhizophora mucronata).
(12) Goria bark (Kandelia rheedii).
(13) Keora fruit (Sonneratia apetala).

Comilla tanstuffs :—

(14) Teri pods (Caesalpinia digyna).

Darjeeling tanstuffs :—

(15) Quercus Panchyphylla acorn cup.
(16) Quercus Fenestrata bark.
(17) ,, ,, wood.
(18) Castanopsis Indica bole bark.

Simla tanstuffs :—

(19) Khasru bark (Quercus Semicarpifolia).

Burmah tanstuffs :—

(20) Quercus Fenestrata bark (open topped variety).
(21) Castanopsis Argyrophylla bark.
(22) Pine bark (Pinus khasya).
(23) Quercus serrata galls.
(24) Quercus serrata acorn cup.
(25) Castanopsis Tribuloids wood.
(26) Quercus Fenestrata wood.
(27) Quercus Lindleyana wood.
(28) Castanopsis Argyrophylla wood.
(29) Quercus spicata wood.

In this section there is a bar opened by Kellner & Co.

MARTIN & CO.

MECHANICAL ENGINEERING DEPARTMENT

6 & 7, CLIVE STREET, CALCUTTA

AGENTS FOR:

RUSTON & HORNSBY LTD.

Excavating Machinery, Oil and Steam Engines, Suction Gas Engines & Producers etc., etc., etc.



EDGAR ALLEN & CO., LTD.

Stone Crushing and Grinding Machinery of all types.



J. & E. HALL LIMITED

Ice Making and Refrigerating Machinery



ALLEY & MACLELLAN LD.

GLASGOW

—— Sentinel Air Compressors ——



E. R. & F. TURNER LTD.

—— Flour Milling Machinery ——



HARDY PATENT PICK Co., Ld.

SHEFFIELD

Rock Drills and Coal Cutting Machinery

Stand No. 12 **Engineering Section**

CHAPTER VII.

CHEMICALS AND SCIENTIFIC INSTRUMENTS SECTION.

Past history.

Chemical industries based on modern scientific methods, are of comparatively recent growth in Bengal and may still be said to be in an infant state. In the early forties and fifties of the last century dyeing with indigenous vegetable and mineral colours, was the chief thriving chemical industry in the province, and, although the extraction of colours and their fixation were done by crude methods, the finished products showed great technical skill, intelligent manipulation and high workmanship. Indigo and *madar* were the principal dye-stuffs used at the time and the dyers knew all about their use in their own way.

With the introduction of science in the curricula of the Calcutta University, a taste for the study of *natural phenomena* grew up among young-men seeking for western scientific knowledge and its application to modern civilised life. This gradually awakened in them a consciousness of the deplorably economic backwardness of their country and of the possibility of development of the vast natural resources of India by the application of practical scientific methods. Facilities for the study of Applied Science were then practically non-existent in the country, and chemical research work (more of a pharmacological character) was confined to a few experts in one or two Government laboratories. It is only during the last 30 or 40 years that a spirit of *scientific research* has developed in the

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country and facilities in the way of research laboratories, technological schools and scholarships have come into existence for the benefit of youngmen who are now taking advantage of the existing local institutions or proceeding to Europe, America and Japan to get themselves trained in the necessary technique for research work or industrial pursuits. This is, to a great extent, responsible for the starting of several new industries in Bengal, a few of which have survived the initial struggle and appear to be doing good business.

The chemical industries in the beginning were confined almost wholly to the manufacture of certain medicinal preparations such as tinctures, extracts; etc., lime-juice, refining of salt-petre, manufacture of perfumes and hair oils, inks, crude soap, pickles, chutneys, etc. Attempts to establish match and glass factories have proved abortive. Some well-known European and Indian Chemists and Druggists of this City used to manufacture specifics, patent and proprietary medicines and toilet and other preparations some of which commanded an enormous sale. Dey's lime-juice at one time enjoyed a great reputation and was largely patronised both by Government and the Shipping Companies.

Manufacture of chemicals on sound business lines was first started in Bengal by Messrs. D. Waldie & Co. The works were originally established at Cossipore and subsequently removed to Konnagar, a provincial town on the west bank of the river Hooghly about 10 miles to the north of Calcutta. One of the important outputs of this firm was *Caoutchicine,* a product of destructive distillation of India-rubber, very

largely used at that time for the manufacture of Methylated Spirit on account of its strong disagreeable smell. The firm also manufactured mineral acids, ether, alcohol and a few other important chemical substances.

Attempts to prepare chemical and pharmaceutical products on a manufacturing scale under purely Indian management and with Indian capital were made at the commencement of the present century by the Bengal Chemical and Pharmaceutical Works Limited, under the inspiration and guidance of Sir P. C. Ray. The Company at first limited its attention to the manufacture of medicinal preparations from a number of indigenous drugs of tried efficacy based on methods prescribed in the British Pharmacopoeia. It gradually took up European medicines as well, and undertook to manufacture sulphuric and other mineral acids and various other useful chemical, pharmaceutical and toilet products, antiseptics, etc., a list of which will be found in its proper place. The Company has set up a large workshop also for the manufacture of various scientific instruments which find a ready sale in the Science Departments of Indian Colleges. Other concerns on a similar line, such as the Calcutta Chemical Co., have since been started and are doing good business.

Nandan & Co., of Bhowanipur were perhaps the first in the field in making earnest efforts to substitute surgical, dissecting and other scientific instruments of foreign manufacture by locally-made apparatus of their own and they succeeded in opening a way for such ware in the market. Others have since followed them in this line with a fair amount of success.

Hand-made paper has for many centuries been an indigenous product of Bengal. Its supply was, however, hopelessly short of the requirements and the shortage was made up by import. The first paper-mill under European management was started at Serampore near Calcutta in the first half of the 19th century and it was followed later on by a few others such as the Bengal Paper Mills and the Titagarh Paper Mills. There is still room for the further development of this industry, as more than 50 per cent. of the paper used in India comes from outside the country.

Extraction of iron from its ores was carried on by crude methods by the people of the country on a limited scale. It is an industry peculiarly suited to Bengal on account of the abundant existence of iron-ore and coal within the province and in its immediate outskirts, and men have not been slow in taking advantage of such favourable conditions. The Barakar Iron Works was the pioneer in this line of industry followed by Burn & Co., Tata & Co., and others. The output of all these concerns has greatly reduced the import of iron and steel from European countries.

Present situation.

The industries which may be said to have gained a stable footing on the soil are those concerned in the manufacture of iron and steel, cement, pottery, paper and paste-board, chemicals and pharmaceuticals, inks, soap, tanning, canning, and a few others of recent growth. The match-industry is struggling; it has not yet been able to secure a sure footing.

The Report of the Indian Industrial Commission 1916-18 says:—"India imports chemicals to the value

of more than a crore of rupees a year; but owing to the great variety and the relatively small quantities of each kind consumed in India under peace conditions, local manufacturers have hitherto limited their attention to the few "heavy" chemicals which were in sufficient demand to support an economic unit of manufacture, and, as in the case of acids, were protected by heavy sea freights. Simple drugs and extracts are also manufactured on a small scale, but only in official medical stores and a few private factories on any recognised standard of purity and strength. Though improvement has been effected under war conditions, much still remains to be done before we exhaust the possibilities of these important products in this direction. We have already referred to the dependence of India on outside sources for sulphur, and to the necessity of insisting on the local smelting of her sulphide ores. In the absence of any means for producing from purely Indian sources sulphuric, nitric and hydrochloric acids, and alkalis, our manufactures,, actual or prospective, of paper, drugs, matches, oils, explosives, disinfectants, dyes and textiles, are dependent upon imports which, under war conditions, might be cut off. Sources of raw materials for "heavy" chemicals are not deficient. The output of saltpetre could be raised to 40,000 tons per annum, and supplementary supplies of nitrates could be produced, if necessary from atmospheric nitrogen; but for this again, cheap electric power is needed. Salt occurs in abundance, and the establishment of caustic soda manufacture, preferably by an electric process that would also yield chlorine, is a necessary part of our chemical programme. There are

available in the country, in fair quantity, many other raw materials necessary for "heavy" chemical manufacture, in addition to those referred to under other heads; among them may be mentioned alum salts, barytes, borax, gypsum, limestone, magnesite, phosphate of lime and ochres. The installation of plant for the recovery of by-products in coking has recently been undertaken, but for the recovery of tar and ammonia only. The recovery of benzol and related products has so far not been attempted, nor has anything been done to utilise the tar by re-distillation or other chemical treatment."

Since the above was written, matters have considerably progressed and Bengal can now boast of some of the best-equipped chemical works in India. It is true that attention is chiefly given to a few "heavy" chemicals, but the variety of such chemicals is steadily on the increase. India is still dependent for sulphur on outside sources and the alkali industry is still unattempted. Manufacturers are still chary of new ventures in view of the unsettled prices of the last nine years. Yet inspite of these adverse conditions, signs are not wanting of a general stimulation of the chemical industry in this country. The larger chemical works are extending their plants and taking up new lines. A number of small chemical works have also sprung up during the last 3 or 4 years and are apparently thriving well.

Medicinal tinctures, extracts, liquors, etc., are being turned out in large quantities by several firms and the standard of purity and strength is being fully maintained. Caffeine and Strychnine are among the latest ventures and it is not too much hope that in the

near future, India will monopolise the production of these and a few other alkloids for its own consumption.

The manufacture of soaps has also reached a high level and some of the works are arranging for the preparation of high-grade glycerine. There are several factories for making paints and varnishes, and as many of the raw materials such as linseed oil, turpentine, ochres and coal-tar pitch are available in India, a big development of this industry may be expected.

The writing ink consumed in Bengal is almost entirely of local manufacture and many of the brands enjoy wide popularity.

There is only one porcelain factory in Bengal. Its products are in large demand and recently the Company has received very large orders from the Government. The tanning industry has now been firmly established in this country on a scientific basis and there are several factories turning out excellent products. The paper industry, an old established one in this country, is expected to receive a fresh stimulus from the new materials that are now being experimented upon.

D. WALDIE & CO., LTD.

Chemical Manufacturers & Engineers,
Distillers, Analysts and Drug Millers.

NATURE OF EXHIBITS.

(1) Fine and Heavy Chemicals, and Analytical Reagents.
(2) Red Lead.
(3) Drugs, Essences, Essential Oils and Forest Products.

(4) Izal, the Sack Steam Disinfector and Sanitary Appliances.

BRIEF HISTORY.

Established at Barnagore, subsequently moved to Cossipore, and in 1894 to the site of the present Factory at Konnagar. The Company was associated for about 30 years with the late Dr. David Waldie, Co-discoverer with Professor Simpson of Edinburgh of the value of Chloroform in surgery.

The Company was converted into a private limited liability Company in 1915, and into a public limited Company in 1922. A branch was opened at Nawabgunge, Cawnpore, in 1891, and was transferred to a new site with special railway facilities at Anwergunge, Cawnpore, in 1919.

Recent developments have included a new site of 25 bighas adjoining the present Konnagar Factory, the erection of a plant at Loyabad, and the erection of Sulphuric Acid Chambers for Messrs. Jardine Skinner & Co., Mackinnon Mackenzie & Co., and the East Indian Railway.

The Company are presently producing Sulphuric Acid on a scale of 10,000 tons a year. Hydrochloric and Nitric Acids are being produced in lesser quantities. Sulphates of Alumina, Magnesia and Iron also are being produced on an extensive scale. Alum and Red Lead are being developed, and will eventually become an important section of the Company's production. Specialisation has been made in chemically pure acids, Analytical reagents, Ether, Spirit and fine chemicals, and in conjunction with the Company's Distillery a bonded warehouse was established some ten years ago, where supplies of all spirituous preparations and extracts are made under bond, and can be supplied at special duty free and concession rates to authorised parties.

The Analytical Department is conducted under the supervision of qualified members of the Institute of Chemistry, and for many years has enjoyed an important connection with the Shellac, Tea and Coal Industries, and holds an official position as Analysts to the Indian Tea Association.

The export and merchandise section of the business is conducted from the Calcutta Office at 1/1, Vansittart Row, and the London Office of the Company at 62, London Wall, E. C. Agencies have been established throughout the whole of North India, and the ground is covered regularly from time to time. The Engineering Department will be glad to advise on the construction of chemical and bye-product plant, oil extraction plant, paper making machinery, and anything appertaining to or requiring chemical production.

Agencies held by the Company include :—

Messrs. Newton Chambers & Co., Ltd., Thorncliffe, Sheffield, **Izal Germicide.**

,, Stevenson & Howell Ltd., London, **Essences, Colours, etc.**

,, Meldrums Ltd., Manchester, **Sack Steam Disinfector.**

,, Federal Ammonia Co., Sydney, Anhyd. **Ammonia.**

The Sulphur Export Corporation, New York, **Raw Sulphur.**

Present Directors of the Company are :—

W. L. Carey, Esq., M.L.C., Partner, F. W. Heilgers & Co.

E. L. Watt, Esq., Partner, Orr Dignam & Co.

E. Hayward, Esq., F.I.C., F.C.S., Partner, D. Waldie & Co.

T. F. Gavin Jones, Esq., Partner, D. Waldie & Co.

W. R. Criper, Esq., F.I.C., F.C.S., A.R.S.M., Consulting Director.

E. L. Watson, Esq., Ph.C., Managing Director.

THE BENGAL CHEMICAL & PHARMACEUTICAL WORKS, LTD.

The Bengal Chemical and Pharmaceutical Works, Ltd., was incorporated in 1901 with a Capital of Rs. 25,000/-. The Company has gradually developed since and has at present a paid-up Capital of Rs. 19,00,000/-. The Directorate and the management are wholly Indian, the present Directors being:—

Sir P. C. Ray, Kt., C.I.E., Ph.D., D.Sc.

Rai Bahadur Dr. Chuni Lal Bose, M.B., F.C.S., I.S.O., C.I.E.

Rai Bahadur Dr. Haridhan Dutt, L.M.S.

Babu Satyananda Bose, M.A., B.L.

Rai Sahib Kunja Bihari Bose, M.A., B.L.

Babu Woopendra Mohun Roy.

Babu Akshoy Kumar Choudhuri.

Babu Rajshekhar Bose, M.A., is the Secretary and Manager of the Company.

The works at Manicktala occupy an area of 40 bighas. The power plant consists of several steam boilers aggregating 600 break horse power and a 60 kilowatt electric generator worked by a semi-Deisel engine. The works consume about 70,000 gallons of water daily, the whole of which is furnished by a tube-well sunk by the Company. There are over a thousand employees including several highly trained chemists and engineers. The Company has its own printing press, saw mills, and an elaborately equipped machine shop.

The principal products of manufacture are:—

Mineral Acids, Ammonia, Epsom Salts, Nitrate of Potash, Sulphate of Iron, Sulphate of Alumina, Hyposulphite of Soda, Alum, Dextrin, Caffeine, Pharmaceutical Extracts, Tinctures, Liquors, etc., Surgical Dressings, Creosote, Disinfectants, Pitch, Scientific Instruments, Laboratory Furniture, Gas Generating Plants, Chemical Fire Extinguishers, etc. The Company also undertakes the sinking of deep tube wells and has sunk several for the Corporation of Calcutta and other public bodies and firms.

The Company has recently acquired through Government a large tract of land at Panihati for extension of its works. It is expected that the new works when completed will be the largest in Asia.

The Company is exhibiting the following products:—

Mineral Acids, Aluminium Sulphate, Magnesium Sulphate and several other heavy chemicals.

Pitch Disinfectants and Creosote.

Dextrine, Caffeine and Strychnine.

Drugs and Pharmaceutical Products.

Toilet Preparations.

Scientific Instruments and Laboratory Fittings.

Fire Extinguishers.

Kerosene Gas Stoves.

SMITH STANISTREET & CO., LTD.

The evolution of the large firms of wholesale and retail chemists in India from the Apothecaries' Shops of a century ago is as striking in its way as anything in the history of trading firms in this country. The Chemist a century ago was unknown; the private medical practitioner kept his own stock

of medicines, dispensed his own prescriptions, calling himself "Apothecary & Surgeon".

Among the oldest and most widely known of these firms is that of Messrs. Smith Stanistreet & Co., Ltd., which has grown from very small beginnings into what is to-day probably one of the largest firms of Wholesale and Manufacturing Chemists east of Suez.

This firm was founded in 1821 by Surgeon J. Robinson, who, in partnership with Dr. James Williamson, opened a small Apothecary's Shop at No. 1, Radhabazar Street, moving thence to No. 2, Lall Bazar in 1826.

In 1846 the premises at Lall Bazar proved inadequate and the firm moved again, this time to the building still occupied by them in Dalhousie Square, then known as No. 6, Tank Square.

During the last two decades Smith Stanistreet & Co., Ltd., have considerably enlarged the manufacturing side of their business, specialising in the manufacture of the official tinctures, spirituous preparations, and other galencials which are essential in the practice of medicine. In addition to this they have, after years of careful research and many set-backs, commenced the difficult and highly technical task of manufacturing on a very large scale the more valuable alkaloids and active principles of the various drugs indigenous to India such as Strychnine and its Salts, Caffeine and its Salts, Santonine, Podophyllin Resin, etc. The "Stanistreet" brand of these products in now finding its way into all parts of the globe.

In order to carry on this work on a commercial scale, extensive up-to-date plant has been installed, and Smith Stanistreet & Co., Ltd., again find it necessary to move their head-quarters to much larger and more modern premises. On December 31st 1923 they will vacate the well-known premises at 9, Dalhousie Square, where their head office has been situated for

practically 80 years. and join up with their factory and laboratories at 18, Convent Road, Entally, so that under one roof they may be in a better position to develop further the manufacturing and service side of a business that has made such remarkable progress.

B. K. PAUL & CO.

About 60 years ago, the late Mr. Butto Kristo Paul started his business in European medicines in a tiny shop in Khongraputty Street, Calcutta. It was only an humble beginning and during the first few years, Mr. B. K. Paul had to work very hard against secular and sectarian odds to popularise medicines of European manufacture amongst his countrymen whose conservativeness and prejudices were in those days impregnable. Mr. B. K. Paul was, however, a keen businessman and it did not take him long to win the confidence of the public. He placed pure and genuine medicines within the easy reach of the big and small by selling his goods at an extremely cut margin of profit, and even a customer for half an anna worth of medicine was not too insignificant for this pioneer of European drug dealers in India. His business commenced to increase rapidly and it became necessary for him to establish relationship with the manufacturing Chemists in Great Britain and the continent and to obtain direct shipments from them. These business relations have since greatly increased and have embraced the United States of America, Japan and all the civilised countries and nations; and the honesty and integrity of the firm have become a tradition all over the world. Mr. B. K. Paul subsequently admitted his sons into the business which he had till then conducted alone, and thenceforth the firm of Messrs. Butto Kristo Paul & Co. made enormous expansions on all sides, the retail trade being supplemented by a

several large buildings in different quarters of the city and its suburbs for accommodation.

The firm also has Optical and Dental departments, bonded Laboratory for manufacturing tinctures and galencial preparations, a Chemical Laboratory for manufacturing chemicals and indigenous drugs, a Research Laboratory for bacteriological and biological work, and owns a large farm where Arrowroot, Barley, Shoti, and indigenous herbs are grown for export and for preparing invalids' foods. The firm also maintains outdoor dispensaries in Calcutta and Dum Dum for the gratuitous distribution of medicine to the poor.

Messrs. Butto Kristo Paul & Co. received the high distinction of opening and maintaining the Camp dispensary and Hospital for free supply of medicines and rendering gratuitous medical aid to all the retainers of the Pageant during the Royal Visit of Their Imperial Majesties the King-Emperor and the Queen Empress of India, and the excellent services thus rendered by Messrs. B. K. Paul & Co. were highly appreciated by the Reception Committee.

The firm has for several years had the honour of being appointed Chemists to the successive Viceroys, and has further been honoured with a Warrant of Appointment to His Royal Highness the Prince of Wales.

The following are some of the exhibits which will be shown by the firm at the Calcutta Exhibition:—

Indigenous Drugs.
Pharmaceutical Medicines.
Tinctures and Galencial Preparations manufactured by the firm.
Laboratory Apparatus.
Surgical Instruments.

Hospital Requisites.

The Firm's Proprietary medicines and toilet products.

Some of the prominent overseas medicines exclusively represented by them.

CALCUTTA SOAP WORKS, LTD.

The Calcutta Soap Works, Ltd. is the outcome of several years' experimental works carried on by a band of graduates (all students of Sir P. C. Ray) who conceived the idea of utilising the vast natural resources of India in vegetable oils, animal fats and perfumery by the manufacture of soaps and by the extraction of glycerine as a bye-product. Started in 1919, the Company has placed in the market washing soaps suitable to silk, wool and linen of all kinds, toilet and medicated soaps of various kinds. Its factory, laid out on the most up-to-date plan is situate at Ballygunge on extensive land owned by the Company on the E. B. Railway Siding, which commands at once all the advantages of easy transport and a large market. It has received from the Government of India an interest-free loan of Rs. 25,000 repayable in easy instalments, coupled with an agreement to purchase Dynamite Glycerine of Ordnance specification manufactured by the Company. Arrangements are well in hand for the installation of suitable machinery for this purpose. The Company has before it an ambitious programme which includes besides manufacture of soap and glycerine, the preparation of toilet requisites and perfumes and the refining of oils and fats. The products of the Company are made to conform to the severest tests of purity and uniformity of the standard set by English and Continental manufacturers.

THE CALCUTTA CHEMICAL CO., LTD.

The Company was started in 1916 with the object of manufacturing yellow Prussiate of Potash and other chemicals from the refuse of the local gas-works. It gradually took up the manufacture of Sulphate of Iron, Glaubers salt and Epsom salt from the waste-products and raw materials available in this country. Among other chemicals which the Company has manufactured in fairly large quantities from time to time, the following may be mentioned:—Carbonate of Potash, Washing Soda, Caustic Soda and Potash, Bleaching Powder, etc.

Subsequently the Company entered into the field of pharmacy with investigations and researches on certain oils, especially Neem oil, carried out at the instance of a well-known local medical practitioner. The fruits of this labour are now known in the market as Margosic Preparations. Margo-soap, the esters of Margosic, Chaulmugric and Morrhuic acids, etc. Boric acid, Mag carb, and a number of other chemicals of the pharmacopœa are being manufactured by the Company. The manufacture of soft and textile soaps, Turkey red oil and certain other industrial chemicals is being carried on by the Company. Bleaching and dyeing departments have been added lately.

CHAPTER VIII.

COTTAGE INDUSTRIES AND INDUSTRIAL AND TECHNICAL SCHOOLS.

The cottage industries of Bengal try to produce some of the articles that are needed by the people for their every day life. Next to the cultivation of food-products, weaving engages the largest number of men and women in the province and in spite of the heavy import of piecegoods the indigenous production of *dhutis, saris* and *chadars* is enormous. Almost every district can boast of a few cotton weaving centres, some of which supply local need only, while others command a wider market. Most of these centres have their characteristic peculiarity of production either in point of texture, colour or border design.

The western districts of the province form the silk area. In olden days royal patronage sustained the silk industry and the products reached a high degree of excellence. The world competition of modern times has been a serious menace, but there are signs of adapting the process of manufacture to the changed circumstances. There is a growing appreciation of these silk fabrics among the Indians themselves and the overseas demand for them for dress-pieces is perceptibly increasing.

The brass and bell-metalware, though manufactured in a crude and primitive way in several centres, still finds its way into every household. The composition of the alloy and the design of the vessels vary from

place to place, but the industry is everywhere in the grip of the mahajans and that prevents any rapid modernisation. Only in one or two places has there been any attempt to adapt it to newer conditions.

Some of the industrial arts of the province are important. Good articles of domestic usefulness are made almost everywhere out of bamboo, cane, reed, grass, etc. The chikon embroidery, chiefly worked by the Mahomedans, both males and females, has been supplied for decades to the markets of Europe and America. Lac toys, ivory carvings and clay models imitate the beauty of form and colour that surrounds the people. Horn, chank and shell supply materials for carving out ornaments or toilet accessories.

The chief problem of these industries is their organisation under the *mahajani* system, on the right solution of which depends their future to a large extent. The co-operative department of the Government has been able to make considerable headway in this direction.

The new movement for prefering indigenous articles to imported ones has come as a blessing to some of these industries which have thus been enabled to keep their heads erect amidst distressing circumstances.

24 districts have participated in the Exhibition and their stalls are arranged in the following order—

Left row—24-Parganas, Khulna, Jessore, Nadia, Murshidabad, Faridpur, Bakhargunj, Noakhali, Tippera, Mymensingh, Dacca.

Right row—Midnapur, Bankura, Malda, Howrah, Hooghly, Burdwan, Birbhum, Rajsahi, Pabna, Bogra, Dinajpur, Rangpur, Darjeeling.

Attention may be drawn to the following particulars :—

Midnapur.

Good mats are among the interesting exhibits from this district. There are two varieties of these, *musland* mats and cypress grass matting. The chief centres of production are Raghunathbari and Panskura in Tamluk Sub-division, Narajole in Ghatal sub-division and Sabang and Narayangarh in Sadar sub-division. The industry is said to be flourishing, the annual production being valued at 10 lacs of rupees.

Silk *saris* from Ghatal known as *Mayurkanthi* and *Pitambari* are in great demand, the annual production ranging around 1½ lacs. Some tussor is woven in Sadar sub-division.

The shirtings of Radhanagar and the *dhutis* of Ramjibanpur find an outlet in Howrah hat. The brass and bell-metal industry of Midnapur is better organised than elsewhere.

Bankura.

The silk industry of Visnupur sub-division is fairly prosperous. A large number of flyshuttle looms has been introduced in the weaving industry and the effect of the co-operative movement among the weavers of Bankura is most marked.

Bankura, Visnupur and Patrasayer are the chief centres of brass and bell-metal manufactures. Shaspur produces cutlery of good quality on a modest scale. Hooka tobacco and conchshell bangles are other articles of importance from Bankura and Visnupur.. Rs. 12,000/- worth of boots and shoes are also produced. Some *muchis* have recently learnt chrome tanning processes on a cottage scale.

Silk rearing is the chief feature of the district. The yarn that is produced supplies not only the local demand but is exported to Bankura, Birbhoom, Benares, Nagpur, Amritsar, Trichinapoly, etc. Of the woven fabrics *katari* cloth is a local speciality, though *saris*, handkerchiefs, gown and suitpieces are also prepared.

Maldah.

Brass and bell-metal industry and cotton weaving are important. Englishbazar and Kaliachuk are the main industrial centres.

The exhibits include cotton fabrics, *kagji* paper, locks, cutlery and glassware. Some matches made on cottage industry scale have also been shown.

Howrah.

Of the smaller industries of the district the fine cotton weaving of Sadar and Kalna sub-divisions is important. Flyshuttle looms are seldom used for the purpose. For decades Kanchannagar has been supplying handmade cutlery; recently some machinery has been introduced in the industry. Brass and bell-metal ware is manufactured on a fairly large scale in Katwa and Kalna sub-divisions.

Burdwan.

Weaving of *tussor*, silk and cotton, and Bell-metal manufacture are the principal industries. Tanning of Nalhati and Tantipara and lac toys of Ilambazar may also be mentioned.

Birbhum.

Tussor cocoons are obtained from the Sonthal Perganas, and these are turned into thread by women labour. Bell-metal utensils come from Sadar and Rampurhat sub-divisions. *Matranch* (striped cotton

cloth) and Pai (rice-measuring bowls) are interesting products of the district.

Rajsahi.

Brass and bell-metal manufacture is carried on in Kalam, Budhpara and Kanaikhali in Nator sub-division. The annual production is valued at 4 lacs of rupees. Rs. 45,000/- worth of matka fabrics are woven of yarn obtained from Maldah. The cotton weavers supply the local need.

Pabna.

Among the exhibits are cane baskets and *sitalpatis,* besides miscellaneous cotton fabrics such as fine *saris, dhutis, loongis, chintz,* and *bedsheets.*

Bogra.

Bogra sends cocoons and silk fabrics and embroidery work. The Basaks of Malatinagar produce specially strong fabrics out of local and Rajsahi silk, price per piece of cloth being Rs. 18/-.

Dinajpur.

Several varieties of cloth are produced which seldom find a market outside the district. *Phota* and *Seota* cloths for Hindus and *Loongis* for Mahomedans are made by the weavers of Chirirbandar. *Pattani* cloth is made in Thakurgaon. *Jhalan* and *Chat* are special types of *satranjis.*

Some molasses and sugar-candy have also been sent.

Rangpur.

The tobacco grown in the district has recently come into prominence. The Korwal Nut settlement of Saidpur has sent Turkish towels, bed-spreads, purdahs, curtains and tea-cloths.

The products of this district presuppose a cool climate. *Chuktuk* and *Maysayn* are blankets woven by the Tibetan women living in the district, while *Rahri* is a variety of Nepali blanket. The annual output of these amounts to Rs. 16,000/-. Lepcha chaddars made by Sikkimese women and Bhutea carpets made at Kalimpong by Tibetan women are the best specimens of their respective crafts. The *Khukri* is the faithful companion of every trueborn Gurkha. The curios will excite the interest of many.

Darjeeling.

Chikon work is done in Baraset sub-division. Fine cloth is produced in Basirhat sub-division as also the coloured cotton cloths of cheap variety that satisfy the fancy of the village folk on festive occasions. The manufacture of locks and steel safes is carried on in the neighbourhood of Calcutta.

24-Perganas.

Cured *chingris* are characteristic of this river district. These are prepared by boiling and smoking and are exported in large quantities to Chittagong and Burma. Ordinary grass mats are produced in many places on the river routes. Date sugar is refined in the north which borders the date palm area. Cotton weaving and cane work are found as usual.

Khulna.

Kaligunj now stands in the region whence Pratapaditya ruled. The cutlery, conchshell ornaments and horn and ivory work produced there are survivals of those days.

Fine cloth and towels, cane and bamboo work, *sola* hats, cutlery and date sugar are among the more interesting exhibits.

Jessore.

Murshidabad.

The chief products of the district are cotton and silk fabrics, blankets, ivory novelties, brass and bell-metal utensils, cutlery, locks, iron-safes and lac. Among Indians the silk *dhutis* and *saris,* matka *chaddars,* tie-dyed silks and handkerchiefs are appreciated, while dress pieces are mainly exported to foreign countries. The silk industry is said to be on the decline though the annual production is estimated at rupees two lacs and a half. Blanket weaving on the other hand is flourishing in Kandi and Jangipur sub-divisions.

The toys and figures by the ivory carvers of Baluchar, Khagra and Murshidabad are well-known for their neatness and accuracy. Their chief market is Bombay, whence they are exported. The Khagra utensils are highly prized in Bengali households, the annual production exceeding 5 lacs of rupees a year. Recently attempts have been made to turn out articles suited to European taste. Lac culture and refining are flourishing industries in Jangipur sub-division.

Noakhali.

Cutlery and cotton cloth are the principal exhibits.

Mymensingh.

Besides cotton and silk cloth, Mymensingh sends brass and bell-metal ware; articles of wood, cane, bamboo and reed; toys, cutlery and some matches produced under cottage industry conditions.

INDUSTRIAL SCHOOLS.

The exhibits have been collected from the Technical and Industrial Schools of this Province, in

order to give the public an idea of the nature of work done at the schools, and the instrustions given to the students.

There are in the Province 13 Technical schools, 46 Industrial schools and 35 Weaving schools, all of which are under the control of the Director of Industries, Bengal.

(*i*) The furniture made by the Faridpur Industrial Mission and the Industrial schools, Krishnagore, Nadia.

(*ii*) The paintings done in oil and water colour by the Indian Art School, Bowbazar and the Maheswarpasha School of Art, Khulna.

(*iii*) The cane work made by the Blind school and the Maharaja Kossimbazar Politechnic school.

(*iv*) The embroideries and laces from Kalimpong Industrial Homes, and the Krishnagore Roman Catholic School, the silk and cotton fabrics from the Government Weaving Institute, Serampore and its outlying centres of instructions.

The above schools manufacture goods in fairly large quantities and are prepared to execute outside orders.

Demonstrations have been arranged for in the following subjects and intimation as to dates on which demonstrations are to be given will be notified later on at the Technical and Industrial schools stall :—

(1) Carpet weaving. (2) Net making. (3) Basket

making. (4) Clay modelling. (5) Dyeing and hand printing of textiles.

The Director of Industries, Bengal, will be pleased to supply information on the courses of study given to the students of these schools.

CHAPTER IX.

BIHAR AND ORISSA ARTS AND CRAFTS STALL.

The stall is 100 ft. × 20 ft. and at each end there are two small stalls which have been allotted to co-operative stores and minor industries. The centre portion is devoted mainly to the identical exhibits which will be made at the arts and crafts stall at the British Empire Exhibition. This consists chiefly of silks from the Government Silk Institute and the Weavers' Co-operative Stores at Bhagalpur, of lace from the convent at Ranchi, silverware from Cuttack and Monghyr, black stoneware from Gaya and hornware from Cuttack.

The silks from the Silk Institute consist mostly of the patterns and designs taken over from the Pusa Agricultural Research Institute. These were designed by the late Mr. F. M. Howlett and by Mrs. Kilby, who has recently again devoted much talent and energy to the correct reproduction of the original designs and the execution of a number of new ones. Some of these silks have been exhibited at various exhibitions in past years, but it has not been possible to secure copies of them. While none of the articles actually exhibited can be purchased, since they are destined for the British Empire Exhibition, they are all registered and priced and orders for reproductions of them can be booked. It is the object of the Silk Institute to improve the silk

industry at Bhagalpur by introducing the manufacture of mulberry, *eri* and *muga* silks among the weavers there, who until recently made nothing but plain *tassar* and *bafta* cloth. The ground has already been broken by the Bhagalpur Weavers' Co-operative Stores, which has introduced various kinds of shirtings and coatings among its members. These silks can also be purchased or ordered at the stall.

There is a fine display of the famous lace made by the Belgian Mission of the Society of Jesus at Ranchi. This lace is equal in quality to anything made in Europe and can be had at far lower prices than any foreign lace. Orders for any of the qualities exhibited can be booked at the stall and will be executed as soon as possible, though early delivery cannot be guaranteed. A few cotton *purdahs* also designed by Mrs. Kilby and some of the silk and cotton cloths woven in various parts of the province are also in view. Specimens of the silver filigree work of Cuttack, of the silver fishes and necklaces made at Monghyr and Kharagpur in that district, of the Gaya black stoneware, and of hornware articles made in Cuttack and a few lizard skins and fancy leather articles from the Utkal Tannery may be seen.

The holders of the private stalls at either end are the Bhagalpur Weavers' Co-operative Stores, whose exhibits have been described, the Ranchi Weavers' Stores, which produces various classes of cotton goods and also manufactures some woollen stuffs for coatings, the National Shoe Stores at Hazaribagh, which manufactures "Economic" shoes from old motor tyres, Messrs. K. B. Karmakar Brothers, Purulia, who make

tea-pruning knives, *kukris*, daggers, sword-sticks, &c. and the Tirhut Moon Button Factory.

There is also a small exhibit of lace and fancy work by the Purulia Lace School managed by the Church Mission Society.

SEE THE INDIAN THEATRE.

THERE ARE DAILY AND NIGHTLY SHOWS IN THE STADIUM.

AFTERNOON TEAS AND DANCING AT THE PALAIS DE DANSE.

CHAPTER X.

THE LADIES' SECTION AND GIRLS' SCHOOLS.

This section will probably prove to be one of the most attractive of the whole Exhibition, and in order to give every facility to the many people who will wish to spend a considerable time there it has been placed in an area which is not crowded with other stalls—between the cricket ground and the lake. One of the buildings in fact overhangs the lake and is most effectively situated. Another building is devoted entirely to Indian women's arts and crafts and it has been organised by Indian ladies. Here will be found a very inviting display of Indian Women's arts and crafts, fancy needle-work and various village industries, while in one stall there is a comprehensive exhibit of Indian condiments which will be greatly appreciated. On the day set apart for ladies only Indian Girl Guides operate in this section and their activities will come as a great surprise to those who see them.

South of this building there is a building in a semi-circular form devoted to illustrations of the work of the Red Cross and the St. John Ambulance. The Red Cross exhibits include the actual packing of parcels of literature for British and Indian soldiers on the frontier, and some idea of the extent to which this work still goes on will be gathered from the display. There is a model of a clinic for Indian babies and explanations of the system on which the clinic is run. There is a model of Lady Chelmsford's exhibits for

Child Welfare. Red Cross badges are on sale and a plentiful supply of literature and charts on Welfare are available. It is hoped that the exhibits of the Red Cross will bring home to the public who see them some idea of the great work which the society is doing in Calcutta and elsewhere.

Not less interesting are the exhibits of the St. John Ambulance where photos of an Anglo-Indian clinic will be shown with mothers at work and a complete display of first aid materials with text-books and photographs. In addition there will be shown handicrafts by the members of the Women's League. There is a rest-room attached to this building where all are welcome. Tea will be served in this rest-room, and daily lectures, some of which will be illustrated by lantern slides, will be delivered.

On the entrance to the women's section in the south west on the right hand side of the path there is an encampment of Girl Guides thoroughly enjoying themselves but nevertheless not there for the fun of it merely. They are ready to give information about the Exhibition and to direct visitors to the various sections, to carry messages and render whatever assistance or service they may. There are railway time tables, study maps of the Exhibition, of Calcutta and India to be found in this encampment and all information about trams, and steamer services as well. Needles and thread, safety pins, pens and ink and all the little requirements which are so often necessary and so impossible to obtain in a place like the Exhibition, will be found in the Girl Guides' encampment and the warm camp fire will invite those who feel the cold of the evenings. When the flag is flying the guides will be on duty.

On the 3rd and 6th December the girls will be at the Stadium in full force from 3 to 5 p.m. and will give a display of drilling, dancing, signalling, first aid and games. Nobody who visits the Exhibition should miss these displays.

The Indian Ladies' Section.

The Indian Ladies' Section consists of about a dozen stalls built round an oval open court. Though this has the disadvantage of bringing the not very artistic outer walls into prominence, this is amply compensated for by the much greater privacy thus obtained, although the stalls are accessible of course to men and women alike except on the purdah days. Apart from the work of the official decorator who, though he cannot be expected to work wonders with corrugated iron roofing and other such-like limitations, has yet shown good taste in the arches of the stall-fronts, the additional interior decoration has been entrusted to the Indian Society of Oriental Art. And as the well-known Indian artist, Srijut Ganendra Nath Tagore has taken great interest in the decoration of this section from its inception, it is hoped that the result will be voted both Indian and artistic. The Secretaries of the Arts and Crafts and Needlework departments have taken some pains also to collect certain kinds of artistic tapestry that are now dying out like many other national art and craft, although they used to be worked with great expense of time and labour by our grandmothers. It is hoped that the really good specimens they have succeeded in collecting will not only elicit the admiration of foreigners, but will also inspire modern daughters of India to combine the best of the East and West in their embroidery as well as in

other branches of education. To this end a few copies are also being shown of Srijut Arabindo Nath Tagore's book on old Indian designs which should prove very helpful to those this way inclined. A stall of books by Indian lady authors is another novel feature.

European Girls' Schools Section.

The building in which this section of the Exhibition is housed is on the main island in the centre of the lake. It can be reached by the road leading from the Amusement Section to the Ladies Section over the bridge to the east of the Pagoda or by the road from the Auckland Road entrance which crosses the grass drive and passes the other portions of the Ladies Section. The building consists of a corrugated iron roof and walls with glass windows and is situated just north of the Bihar and Orissa Government stall.

The exhibits which are all the work of girls of European schools in Bengal form an interesting and varied collection. There are dresses beautifully made and embroidered by girls of various ages from materials ranging from the highest quality to the least expensive. Samples of the sewing and embroidery which the girls do in their schools can also be seen and examples of crochet work and knitting. In another part of the room that are many models ingeniously made from very inexpensive materials such as cotton reels and corks etc. Some of the schools have also sent hand work models and drawings. The sewing and embroidery is of a very high standard and the toys are extraordinarily clever. Many of the frocks have been made by young children and altogether the section is of interest to all parents.

The following is a list of the schools that have participated in this exhibit.

Loreto Convent	...	Darjeeling.
Dow Hill Training College and School	..	Kurseong.
Queen's Hill Girls High School		Darjeeling.
Diocesan Girls High School	...	Darjeeling.
St. John's Diocesan Day School		Calcutta.
Loreto Convent	...	Dharamtala.
St. Francis Xavier's	...	Dacca.
Loreto House ...	...	Middleton Row.
Loreto Convent	...	Entally.
Free School ...	...	Calcutta.
St. Helen's Convent	...	Kurseong.
Pratt's Memorial School	...	Calcutta.
St. Paul's Mission School	...	Calcutta.

CHAPTER XI.

AGRICULTURE.

Rice.

Bengal is first and foremost an agricultural country. With a population of 46½ millions it is not unnatural that the bulk of the cultivated area in the province should be devoted to the production of food-stuffs. Out of a total of nearly 32 million acres under crops 23 million acres are devoted to the cultivation of paddy giving a yield of 16.8 million tons of paddy valued at about 137.5 crores of rupees or £91,670,000. Practically the whole of the paddy produced in the Province is consumed within the Province, only some 400,000 tons being exported annually.

The rice plant has extraordinary powers of adaptability, with the result that there are varieties suitable for all the various conditions which prevail in Bengal. From one extreme, a plant which has adapted itself to growing in ten feet of water, we go to the other to find a plant satisfied with moisture conditions suitable for cereal crops like wheat or oats. Another class will only mature in the steamy hot season, whilst another will only grow in the cold weather. The crops are divided roughly into three groups, according to the growing season, "Aus" which ripens in July and August, "Aman" which ripens in November and December, "Boro" which ripens in April and May. Within these groups there are numberless varieties suited to Highland, Lowland, Deep water, Hills, etc.

Of these again, some are sown broadcast whilst others are transplanted.

In the Exhibition the specimens have been classified according to the season of their growth thus :—

Aus Paddy	Highland
	Deep water
	Transplanted
Aman Paddy	Deep water
	Transplanted
Boro Paddy	Transplanted
	Lepi

Specimens are also exhibited of wild paddies, clustered and other curious paddies, paddies used for medicinal purposes, etc. There are a number of preparations made from rice such as "Chira" "Muri" and "Khai". For these preparations special varieties are esteemed and these are exhibited along with the products into which they are prepared.

Other Food Grains.

Compared with the 23,000,000 acres under paddy the area of 1,800,000 acres occupied by other food crops appears somewhat insignificant. The bulk of this area, however, is occupied by pulse crops, pulses being an important constituent in the dietary of the people. Collections of varieties of pulses and other food grains are exhibited together with the finished products where preparations are made from them.

Oil seeds.

The next important article of diet in Bengal is oil and 1,500,000 acres are devoted annually to the production of oil seeds. Mustard oil is the principal oil consumed and rape and mustard occupy the greater part of the area. There

are numerous varieties which have become acclimatized to particular tracts and the variation in oil content between varieties is considerable. There are a number of small power mills throughout the Province extracting the oil, but the bulk of the oil is extracted by bullock driven mills in the villages. The cake produced as a residue is utilized throughout the Province as cattle food, and has considerably increased in value of late years. The cocoanut is plentiful throughout the lower Gangetic basin, but the produce is consumed locally or else wasted. There appears to be reason to believe that a trade in copra should be a sound commercial undertaking. Besides collections of varieties of oil seeds, samples of oil and cake are also exhibited. All the above crops are under investigation by the agricultural Department and heavy yielding strains of several are in process of multiplication.

Spices and condiments.

An area of 200,000 acres is occupied annually by crops utilized for spices and condiments. Of this area a considerable amount is occupied by chillies which, in Northern Bengal in particular, are grown on a field scale. Turmeric and ginger are also grown as field crops on a considerable scale. The majority of the crops grown for spices and condiments are grown on garden land near the homesteads. Some are shy yielders and sell for high prices in the market. Samples are shown of the produce of most of the plants grown in Bengal.

Sugar.

Although Bengal does not compete in the world's sugar market, the produce of the 300,000 acres put down annually to sugar is sufficient to meet her own demand for *gur*. Over 58,500 acres of this area is occupied by date sugar

palms whilst the remainder is under sugar-cane. The cultivation of sugar-cane in Bengal is of great antiquity and there appears to be no doubt that the importation of exotic canes has been going on for generations. Many of these proved unsuitable and no longer exist, but many of the medium and thick canes to be found to-day are degenerate progeny of these importations. The cane in Bengal can be classified into three groups (1) the Reed canes, probably indigenous, which give poor outturns of *gur*, (2) the medium canes which are better yielders and (3) the thick soft canes valued for chewing purposes. Many of these are very liable to fungoid diseases and to insect pests and are being replaced by the disease resistant variety "Yellow Tanna" introduced by the Agricultural Department. The Department has experimented with hundreds of varieties and is at present testing crosses and selections raised in Coimbatore from Indian parents. Several varieties of cane in each class are on exhibition as well as specimens of exotic canes grown on the Dacca Farm. The *gur* from several of these varieties is also shown as well as eight samples of selected grades of white sugar refined at the Cossipore Sugar Factory. Samples are also shown of "Dobarrah" and "Akbarrah" the 1st and 2nd qualities of white date sugar. *Gur* manufactured according to the directions of the Agricultural Department is also on exhibition.

Fibres.

The crops so far dealt with are raised to meet the food requirements of the Province. Of the crops which are raised for export jute is by far the most important. Jute is indigenous in Bengal yet it is within comparatively recent times that it became a world's commercial crop. Less than

one hundred years ago, the only fabrics produced were prepared on small hand looms in the villages, and utilized for clothing. The opening up of trade in grain created a demand for bags for transport and the rough gunnies prepared in the villages were eagerly bought up for this purpose. Several shipments of the raw fibre were sent to Dundee for testing but it was not until 1828 that suitable machinery was evolved and the Dundee jute trade became established. 1858 saw the first real attempt to introduce jute spinning machinery in Calcutta. The following figures illustrate the enormous expansion in production since 1850.

Jute.

Season.			Bales of 400 lbs.
1850-51	...	...	158,183
1862-63	...	...	609,146
1872-73	...	...	2,275,476
1892-93	...	...	5,700,000
1902-03	...	...	6,577,000
1912-13	...	...	9,842,800

Practically one half of the total production of raw jute is consumed in the mills in India the remainder being distributed throughout the world for manufacture into many different types of fabrics. The coarser classes of fibre are used for the manufacture of gunny cloth and gunnies whilst the finer classes are manufactured into hessians, sacking, carpets, rugs and backing for linoleums and oil-cloth.

The average area sown under jute in Bengal is 2,300,000 acres. Two species are cultivated, Chorchorus capsularis, which can after reaching a certain stage of maturity thrive in as much as five or six

feet of water and is therefore suited to low lands, and Chorchorus Olitorius which does not thrive on deeply inundated land. Of these two species there are numbers of varieties differing in colour and yield and in the quality of the fibre they produce. The fibre Section of the Agricultural Department has devoted much attention to the evolving of high yielding races and some of the races evolved are extensively cultivated. Specimens are shown of the raw fibre of several races and of the products into which they are manufactured.

Cotton.

Sentiment is probably responsible for much of the agitation regarding the extension of cotton cultivation in Bengal. The Dacca muslins were renowned in the past and there is a natural desire that they should not die out. The fineness of the product was due more to skill in the manufacture than to the quality of the raw material which was probably procured from a tree cotton.

Of 53,200 acres returned as growing cotton in Bengal 49,600 grow hill cottons. These cottons are exceptionally short in the staple and are not suitable for commercial spinning.

Specimens are shown of indigenous and exotic varieties of cotton which are being tested by the Agricultural Department.

Two other fibre plants are of commercial importance in Bengal, "Hibiscus Cannabinus" or "Mesta pat" and "Crotalaria" Juncea or "Sunn pat".

Mesta.

A considerable area of "Mesta" is sown in the Backerganj District and the fibre finds its way into the jute shipments. It is disliked by the spinners owing to its being brittle and coarser than

jute. Two other species of Hibiscus also find their way into the jute shipments, "Hibiscus Esculentus" or "Bhindi", the fruit of which, "Lady's Finger", is used as a vegetable, and "Hibiscus Sabdariffa" or "Roselle" the flower of which is used for jelly making.

A fibre which deserves more attention is that procured from "Hibiscus Tillaceus" which is to be found in abundance on the sea-board districts.

Sunn Hemp.

Sunn Hemp is grown on an area of roughly 65,800 acres, Chittagong, Mymensingh and Pabna districts being the districts chiefly concerned. Although the bulk of the fibre is utilized locally, the fibre that reaches the London market commands much higher prices than the Benares quality the prices ruling in July of this year being £37 and £26-10-0 respectively per ton, for first quality.

Rhea.

There has been a decrease in the cultivation of "Rhea" in the Province but this fine fibre is now being enquired for, and, given a market, the cultivation will doubtless extend. The fibre is one of the strongest known and is less affected by moisture than any other fibre. One of its chief drawbacks is the difficulty in degumming which adds considerably to the cost of producing fibre suitable for spinning.

Cocoanuts.

Despite the large area under cocoanuts in Bengal no organized trade exists in Coir fibre. A considerable quantity is used locally but there is also great wastage. Besides samples of the above fibres and of goods manufactured from them specimens are shown of numerous other fibres used for fabrics, Rope making, Paper making, Mat making and Basket making.

An acreage of over 250,000 acres is devoted annually to the cultivation of tobacco. Taking the average return per acre to be Rs. 150, this area gives an annual income to the cultivators of four and a half crores of rupees. The principal tobacco tracts lie in the Rungpur and Jalpaiguri districts and the Cooch Behar State and from these tracts there is a large export, chiefly to Burma. The better qualities of tobacco fetch high prices, up to Rs. 40 per maund. It is commonly supposed that the tobacco exported to Burma is used in the manufacture of the Burma cheroot of commerce but this is not so. It is used as a filling for the "Torches" smoked by the Burmese themselves. There are two species of tobacco commonly grown "Nicotiana Tabacum" and "Nicotiana Rustica" locally known as "Motihari". This latter is very coarse and very strong and is in demand as a hookah tobacco.

Tobacco.

The Agricultural Department, on the tobacco farm at Rungpur, has done a considerable amount of selection work on both species of tobacco and the selections are much in demand. Experiments have been carried out with exotic tobaccos, Turkish, Virginian, and cigar tobaccos. These have led to the introduction of the Sumatra wrapper tobacco which has proved very successful and its cultivation is extending.

In the Exhibition will be found over 20 samples of the cured leaf of local and exotic varieties and the plants of several of these varieties are shown growing in pots. A cigar roller demonstrates daily the manufacture of cheroots by hand.

One of the most flourishing industries of the sea-

board districts of Bengal is the production of Betel nuts.

Betelnuts.

These are exported all over India, being used as a masticatory. A small portion of the crop finds its way into the market to be used for medicinal purposes. Samples of several varieties are shown in the Exhibition.

At the census taken in 1914 the total head of cattle was returned at the enormous number of 25,355,000.

Fodder crops.

To maintain this huge total it would be imagined that the area under fodder crops would be correspondingly high. This however is not the case as an area of only 110,000 acres is returned as the normal under fodder crops. The majority of the cattle in Bengal have to eke out an existence on paddy straw. The Agricultural Department endeavours to raise the standard of cattle management, and a number of fodder crops introduced by the Department are exhibited.

Despite the large number of cattle, the milk problem is as acute in Bengal as elsewhere, and the

Dairying.

Department of Agriculture, through its cattle-breeding farm at Rungpur, is engaged in the production and distribution of dual purpose animals which are good milkers as well as good draught animals. There is no organized Dairying industry beyond the manufacture of *ghee*. Of other products the "Dacca" cheese from Mymensingh district and the "Bandel" cheese are marketed on a small scale.

With an area of over 50,000,000 acres there are wide variations in the physical and chemical characteris-

Soils and Manures.

tics of soils in different districts in Bengal. Each type of soil requires its own peculiar treatment and a fertilizer suitable for

one type may produce a negative result on another. The Agricultural Department has conducted a survey of the soils of Bengal with a view to arriving at their improvement by the application of manures. Samples of the typical soils of the Province are exhibited as well as samples of the manures used on these soils. Green manuring has been advised by the Department as a cheap method of improving certain soils and samples of the seed and of the green plants of crops used as green manures are on exhibition. Messrs. Shaw Wallace & Co. who deal extensively in manures are exhibiting samples of the manures which they manufacture.

Sericulture.

At one time the most flourishing industry in Bengal, the silk industry eventually, through a number of causes, became a mere nucleus of its former self. The introduction of cheap artificial silk led to a depreciation in the value of the real article, and disease made serious inroads into the rearers' stocks. The Agricultural Department instituted researches into the causes of the disease and eventually developed a system of distribution of disease free seed which has proved a great success. Work was also commenced and is still being carried on in evolving higher yielding races. In the Exhibition the raw silk from the different breeds is shown as well as different classes of manufactured articles. Approved methods of rearing and the reeling of the silk are being demonstrated throughout the period of the Exhibition.

Fisheries.

Space has been allotted in the Agricultural Section to Fisheries. Bengal is a land of rivers yet how often is the complaint of lack of fish heard? Like many other industries the trade is in the hands of middlemen who have no concern with

its general development, and it has been left to a Government Department, far too small in size to make much impression, to attempt to organize the industry. The Fishery Department is exhibiting specimens of the fish common in Bengal and demonstrates daily approved methods of fish curing. A space is reserved in the Exhibition where the Publications, bulletins, and leaflets issued by the Department of Agriculture can be obtained. Officers of the Department are in attendance and they will be pleased to give visitors any information they require. Series of charts are exhibited illustrating various features such as the expansion of particular crops and the development of new methods.

Propaganda.

An exhaustive catalogue of the exhibits in the Agricultural Section is printed separately. It is on sale in the Agricultural Section. The catalogue contains detailed information of nearly 1400 different exhibits. It has been prepared by the Department of Agriculture of Bengal. No one interested in the Agriculture of Bengal should be without a copy of this valuable compilation.

Catalogue.

CHAPTER XII.

HORTICULTURE.

THE AGRICULTURAL AND HORTICULTURAL SOCIETY OF INDIA.

Horticultural development in India is of recent origin and the pioneers of the movement were surely those gentlemen who founded the Agricultural and Horticultural Society of India in 1820.

At the close of 1819 some correspondence regarding the founding of an Agricultural Society was published in "The Mirror", a daily paper of that period, and early the following year several gentlemen interested in the subject, received a prospectus prepared by Revd. Wm. Carey. On the 14th September 1820 we find from the records extant, that a meeting took place in the Town Hall and was attended by a large number of Indian and European gentlemen with Mr. C. Towler in the chair. It was resolved to form "The Agricultural Society of India" and to undertake the promotion of Horticulture as a branch of the main object.

The celebrated Baptist Missionary, Revd. William Carey, was appointed Secretary and at the request of his colleagues, circulated a questionnaire to all members about the nature of the soil in their respective Districts, crops grown, etc.; these replies were embodied in the first Transactions of the Society.

For the first few years of its existence the Society was without a garden and confined its efforts to the improving of vegetables by the distribution of superior strains of imported seed and by giving prizes for the successful cultivation and importation of choice fruit grafts. A small plot of land in Alipore, near the

Budge Budge Road, was obtained from Government but this had to be abandoned after seven years owing to the reduction of the Society's finances through the failure of several mercantile firms. At the same time a piece of ground at Akra, where experimental cultivation of cotton, tobacco etc. had been undertaken, had to be given up just as certain experiments were near a successful completion. In 1836 assisted by the Superintendent of the Royal Botanical Gardens, the society obtained two acres of land and this was eventually increased to fourteen to provide a nursery of sugar-cane from Mauritius. Here also fruit trees were grown and cotton and other staples till 1844, when another plot of eight acres was added.

Members had frequently made enquiries for flowering shrubs and trees and this additional plot was devoted to the cultivation of such plants. Government required the land in 1866 and the Society had to relinquish possession and were without a garden again till 1879 when a waste piece of ground of 64 bigahs in Alipore was taken over and the Society settled down in its present garden. A large sum of money was spent in building a house, laying out roads, etc., and in addition to the valuable orchard of mango and other fruit trees planted, a considerable section was devoted to flowering and ornamental trees and shrubs. The propagation of these became more important as demand increased and further space was appropriated to floriculture. In the centre of the grounds a large open grass plot was reserved for Flower Shows. In the early days the Society also received from the Government various sums of money as grants in aid and premia, but since 1900 it has become entirely self-supporting

and depends upon the subscriptions of its members for its income. The member enjoys many benefits for the small sum he is called upon to pay; he receives seeds and plants and may call for advice on any horticultural subject from the Society.

In less than two years after the founding of the Society we find that Gold and Silver Medals were offered for the successful cultivation of superior kinds of European fruit and vegetables while prizes were also given for cotton, tea, tobacco and sugar-cane. Liberal premia were awarded for essays on various important subjects which appear in the Society's Journals. These have been freely drawn upon for Government publications, for instance, extracts in the Dictionary of Economic Products of India, etc. At its Flower Shows, silver and bronze medals, as well as money prizes, were offered for flowers, fruit and vegetables while the ornamental section was not forgotten. By these methods the Society has constantly kept horticulture before the public and it has been rewarded by the increased attention, both on the part of Indians and Europeans, that horticulture has received.

Some of the earliest efforts of the Society were attempts towards improving the quality of the fruit and vegetables grown in the country. In 1823 the Society imported £100 worth of grafted fruit trees from England for distribution to its members and followed this up with further consignments from time to time. Apples, pears, peaches, plums, etc., were either unobtainable or represented by poor types till the Society came forward with these consignments. As

regards vegetables, for thirty years free distribution of the best kinds were made amongst the market gardeners and the results were satisfactory from the very first. In 1830 a report submitted by the Horticultural Committee mentions that at the Show held in the Town Hall that year "the vegetables staged could compare favourably with any grown under the most advanced system of Horticulture." Ten years later the produce submitted at the Flower Show was pronounced as being "equal to that offered in Covent Garden Market." It was now found that these Exhibitions, which had hitherto been held in the Town Hall, had grown to such an extent that more space was required and in future the Shows took place under canvas either at the Eden Gardens or the Society's Garden.

The improvement of indigenous fruit trees was also considered and careful selection made of innumerable varieties, the very best being grown in the Society's orchard for distribution to members.

Cotton and Tobacco rceived a great deal of attention in the early eighties and especially in Calcutta and Behar. It is interesting to note that for many years the Society obtained the best type of cotton seed from the U. S. A. and a sum of Rs. 1,000 was set aside in 1838 for the purchase of cotton seed from various parts of the world. Tea and Coffee also came in for experiment but the successful cultivation of the latter was only reported from South India and in a few places in North India.

As already mentioned, Sugar-cane was largely distributed by the Society and the fact that 34,000 canes passed out the first year and this number was continued for several successive years shows the extent to which

the Society carried on its distribution. For seventy-five years superior varieties of Maize were expressly imported from the U. S. A. and freely distributed while cereals such as wheat, paddy, oats, etc., were grown and experimented with.

Fodder Grasses too received attention, Guinea Grass was introduced by the Society together with Lucerne, Reana and many other fodder plants while Rhea (Ramie) and fibre yielding shrubs also were experimented with. The Society it was, too, which drew the attention of Government to the importance of the introduction of Cinchona while the valuable properties of Guttapercha, which had been communicated to the Society through its foreign correspondents, Dr. Mongomerie and Revd. Mr. White of Singapore, were brought to public notice.

We find in the Society's Journals that although valuable prizes were offered for many years for the improvement of live stock, competition was so poor that ultimately this line of work was discontinued. Till 1895 persistent efforts were made towards the improvement of indigenous silk yielders.

The Society therefore may well claim to have laid the foundations for the Agricultural Department and it was only when the importance of agriculture began to be more fully realised and Society could not devote the time and ground to experimental work that Government relieved it of the work in 1900.

Prior to 1900 the cultivation of fruit and economical plants held first place and horticulture was practised to a slight extent. Consignments of exotic flowers and foliage plants are recorded to have been obtained from abroad but some thirty years ago demands for shrubs

trees, etc., had so increased that special attention was devoted to the horticultural branch of the Society. From 1892 to 1904 a few experiments in cross breeding Amaryllis and Cannas took place but during the past few years a large number of flowering shrubs have received the attention of the hybridist and the Society can lay claim to improvements in the following lines: Amarlyllis, Barleria, Canna, Cooperanthes, Crinum, Dracæna, Dombeya, Hedychium, Hibiscus, Ixora, Lagerstrœmia, Plumeria. Owing to the limited extent of the Society's garden at Alipore it is impossible to carry out studies on Mendelian lines.

The Viceroys of India have been patrons of the Society. The Marquis of Hastings encouraged its institution and his example in supporting the Society in their efforts to improve Agri-Horticulture in India, has been followed by his successors. The office-bearers of the Society include many very well-known names.

The Horticultural Section have a very elaborate programme for December provided the weather conditions are favourable. In addition to the general exhibit of ornamental, economic and flowering plants which will be staged for the full period of Exhibition, there will be a Two Day Show and the Committee will use the Dancing Hall for this purpose. Prizes are offered for competition in many sections and it is hoped that entries will be numerous. The season for the real winter annuals is much later but a certain few will be in flower during the month of December while early vegetables and fruits from various parts of India have already been promised.

The Committee have several interesting items which should not fail to attract the public. A series of

Magic Lantern slides illustrating "Cross breeding" and "Beautiful Flowering plants" found in Indian gardens, will be on Exhibition and by special request two popular lectures have been arranged for the public at which these slides will be shewn. There will also be a number of preserved specimens of fruit in spirit, noticeable among them being a mango weighing as much as 10 lbs.

In conjunction with the above four composite paintings of mango fruit will be shewn, representing seventy of the types grown in India but we may remark in passing that the Agri-Horticultural Society possess a collection of over 700 mango paintings and consider that this is far from complete. Another very interesting item will be earthen models of fruit and vegetables manufactured in India, this has been got together with some difficulty and is as representative a collection as will be found any where in the country. Messrs. Sutton & Sons, Reading are also staging an exhibit of their vegetable models especially obtained from England for the occasion, and Messrs. T. E. Thomson are showing garden machinery.

DANCE AT THE PALAIS DE DANSE.

AFTERNOONS AND EVENINGS.

CHAPTER XIII.

HISTORICAL AND ARCHAEOLOGICAL SECTION.

This section is located in a portion of the Exhibition office building to the north of the Pagoda. The exhibits of this section comprise documents of historical importance from Govt. Archives in Calcutta, *viz.*, The Imperial Record Dept. and the Bengal Record Room, and old manuscripts, pictures, and other historical and archæological relics from the Museums and at Patna and Dacca from private collectors.

Of the manuscript documents exhibited by the Imperial Record Dept. special mention may be made of the notes and minutes in which the Governor-General Lord William Bentinck and the members of his Council (of whom the Hon'ble T. B. afterwards Lord Macaulay was one) discussed the question of promoting European literature and science among the natives of India in 1835, and the Minute which the next Governor-General, Lord Auckland, recorded on the subject of native education in 1839, the holographs of Lord Clive, the treaty of 1845 with King Christian VIII of Denmark which transferred the Dutch Settlements in India to the English, a letter written in 1773 by Warren Hastings to the Council at Calcutta intimating the cession of Kora and Allahabad to the *Nawab Vazir* of Oudh in consideration for a sum of fifty lakhs of rupees, the *farmans* and *sanads* granted to the East India Company by the Mughal Emperors dating from 1633 and including those by which the *Diwani* of Bengal, Bihar and

Orissa was conferred upon the Company in 1765 and the original Persian letters received from Indian Princes, Chiefs and Nobles, which apart from their historical importance represented fine specimens of caligraphy, negotiations by Tipu Sultan for a treaty of peace with the English, a letter of gratitude from the Maharaja of Mysore on being restored to the kingdom of his ancestors which had been usurped by Haidar Ali, a letter from the Sheriff of Calcutta, dated the 26th October 1827, to the Chief Secretary to Government, requesting permission to convene a meeting of the British merchants and other inhabitants of Calcutta, at the Town Hall to discuss the question of equalising the duties on East and West India sugar and other matters.

Of the exhibits from the Govt. of Bengal those deserving of special mention are the original minutes by Lord Cornwallis and Sir John Shore regarding the permanent settlement of Bengal, Bihar and Orissa (1789-90) a minute by Warren Hastings, Governor-General, and Richard Barwell, one of the Councillors, on the conduct of W. M. Thackeray, father of Thackeray, the novelist, while Collector of Sylhet (1773), and a number of original *Qistbundis Qabuliats* and other documents in which figured the ancestors of some of the leading *Zamindars* in Bengal, *e.g.*, Krishna Kanta Nandi (commonly called Kanto Babu) the well-known *Banian* of Warren Hastings and founder of the Kasimbazar Raj Family, Maharajadhiraj Tej Chand Bahadur of Burdwan, Maharani Bhawani of Natore, Maharajadhiraj Shib Chandra Bahadur of Nadia, Maharaja Radhanath Bahadur of Dinajpur and Raja Raj Sing who was an ancestor of the Maharaja of Susang.

Among the exhibits from the Corporation of Calcutta some pictures of old Calcutta, by T. Daniell, *viz.*, a view of Chandpal Ghat, view of Chitpore Road (August 1799), the factory at Calcutta (1786), and the Old Court House, January (1805).

Of the exhibits lent by private gentlemen special mention may be made of Timur's sword exhibited by Sahibzada Ghulam Husain Shah of the Mysore Family, having the following inscription engraved on the blade :—"In the name of God the Compassionate and Merciful. The hand of God is above their hands. The irresistible sword, the enemy-killer, the victorious, the sword of the King of the Kings, the monarch of the monarchs, the Sultan Sahib Qiran, His Majesty Amir Timur. May God perpetuate his kingdom and Empire." Sahibzada Solaiman Shekoh of the same Family will exhibit some pictures depicting the closing scenes of Tipu's life and the surrender of his two sons. There are also two portraits of Tipu Sultan lent by Sahibzada Halimuzzaman of the Mysore Family.

The collection lent by Mr. Abhiram Mullick contains some interesting Bank notes of the early days, of which the five rupees note of 1824 bearing the signature of Babu Ramchandra Seal in Bengali is worthy of notice. He will also exhibit some views of Old Calcutta by B. Fraser. Some interesting palm leaf manuscripts in letters of gold will be exhibied by Mr. P. K. Das. These were secured by the late Rai Sarat Chandra Das Bahadur, C.I.E., in 1886 from a Buddhist Monastery in Siam. There is another curious lithographic reproduction of *Bhava Chakra,* which gives the various stages through which, according to the

teachings of Buddha, a soul must transmigrate before it can attain Budhahood or Nirvana.

Rev. H. Hosten's exhibits contain some interesting photographs of pre-Portuguese Christian relics in India, Ceylon, Burma and China.

Of paintings of the Mughal School there are some very good specimens. Among the pictures lent by Mr. A. Ghosh, there is an interesting portrait of Sultana Razia Begam, having on its back the seal of Zebun-Nisa Begam the poetic daughter of Aurangzeb. The picture of Nadir Shah receiving the court-jewels after the sack of Delhi, bears the seal of Shah Alam. The picture of Akbar as a boy, drinking water at a well while returning from the chase deserves special mention. The subject is a favourite one with Mughal painters. In the distance are seen a group of buildings and some troops, while there is a mango-tree behind the well. This as well as the picture of Nawab Habsh Khan, an Abyssinian officer of the time of Shah Jahan were exhibited as fine specimens of Mughal painting at Delhi on the occasion of the Coronation Durbar. In Mr. Ghose's collection is a very romantic picture of Jahangir and Nur Jahan watching the newmoon after the fasting month of *Ramzan*. At the foot of the painting is inscribed the following dialogue :—*Jahangir* : "The crescent of the *Id* appears on the horizon". *Nurjahan* : "The missing key of the tavern has been found". It is clear from the sarcastic remarks of Nur Jahan that in spite of his intemperate habits Jahangir used to respect the sanctity of the holy month of *Ramzan*.

The *farmans* exhibited by the Maharaja Bahadur of Nadia bear the original seals of the Emperor Jahangir, Shah Muhammad Shuja, Muhammad Azam

(son of Emperor Alamgir), and Emperor Shah Alam. The oldest one, dated the 20th April 1613 A.D., was granted by the Emperor Jahangir conferring the office of Chaudhri and Qanungo on Bhattanand Chaudhri for the parganas of Bagwan, Nadia, etc.

Two swords and a jewelled dagger exhibited by the Maharaja Bahadur are also of much interest. Of the swords one was presented by Lord Clive to Maharaja Krishna Chandra who also got the title of "Maharajendra Bahadur", at the time. The other was used by Maharaja Raghuram Ray, father of Maharaja Krishna Chandra Ray Bahadur.

The Sanskrit Mahabharat exhibited by Raja Bhupendra Narayan Sinha Bahadur, of Nashipur, is a very old and bulky manuscript. The edges of the front page of each *parba* are covered with coloured paintings.

Of the various exhibits received from Kumar Debendra Nath Rai of Kunjaghata the following are of much peculiar interest.

1. Letter of Maharaja Nanda Kumar to his son Gurudas Gourpati Bahadur.

2. An ivory box presented by Nawab Siraj-dowla to Maharaja Nanda Kumar.

3. The walking stick of Maharaja Nanda Kumar.

Some of the exhibits lent by the Patna Museum are of particular interest to antiquarians, *viz.*, Palaeoliths, Neoliths and Copper Age antiquities. The Pataliputra antiquities display the Terracotta objects of the Mauryya period and the peculiar head-dress of the males and females. There are a few stone sculptures of the Gupta period. There are also some seals or impressions of them. The glass seals inscribed with legend in ancient Brahmi characters are of general

interest while the marks of royal seals of Mauryya time and Kshatrapa dynasty will be of special interest to antiquarians. Among the miscellaneous objects may be mentioned some copper plates, estampages and coins. A set of coins show the development from the earliest time up to the time of the East India Company.

Of the manuscripts the Arabic History of Gujarat in two volumes by Abdullah-al-Makki lent by the Calcutta Madrasah needs special mention. It is being edited by Sir Edward Denison Ross in the Indian text series.

Of special interest is a unique copy of the Koran written on a scroll of paper, designed apparently for being used as a charm encased in silver or gold, the head-dress of the wearer.

From the Imperial Library have been received some rare books on Indian History, some of them having been written in the 16th century. The *Tarikh-i-Firoz Shahi* and the *Mirat-i-Jahan Numa* deserve special notice.

The *Panj-Sura* containing five chapters of the Koran lent by Mr. Ghulam Abbas is remarkable for its caligraphy and artistic design.

There is a curious document in Persian and Bengali which dates back to 1697, the 39th year of the reign of the Emperor Aurangzeb. It is a deed of sale entered into by a husband and wife in the district of Mymensingh selling themselves into slavery for a sum of Rs. 9 during a period of great scarcity.

The exhibits of the Oriental Public Library, Bankipore, though few in number are absolutely unique. The *Tarikh-i-Khandan-i-Timuria*—a history of the Timurides— is a rare manuscript contain-

ing the autograph of Shah Jahan and 133 portraits by the court painters of Akbar. Then there is the *Shahnamah* which was presented to the Emperor Shah Jahan by Ali Mardan Khan, Governor of Kabul. This contains 26 paintings. In this collection will also be found the Koran Sharif written by the renowned caligraphist Yaqut-al-Mustasmi. Specimens of the Turkish art of painting can be seen in the *Shahanshah-namah* which once belonged to the royal library of Constantinople.

Mr. P. C. Nahar's exhibits contain interesting manuscripts, paintings and farmans. Of the manuscripts the Jain Scroll is worthy of special attention. It is an illuminated piece measuring about a foot wide and 40 ft. long. The series of pictures, which are in fine Rajput style of painting are preceded by a *Kumva-Kalas* and eight other auspicious signs known as *Astamangalik* followed by fourteen dreams of Queen Trisala Debi who is next represented as reclining on a bedstead with her two female attendants. The next picture is a scene where her husband, King Siddhartha, is seated expounding the meaning of such dreams. Next comes the picture of the preceptor preaching in his chamber attended by the laity and priests. Then follows the scenes of the various portions of a Rajput town and its market place with a number of shops and high roads, ending with the city gate. This is followed by an interesting scene outside the town where the whole assembly of Chaturbid Sangha (congregation) is bidding farewell to the preacher. Of Mr. Nahar's pictures the *Nauratan* (nine jewels) is unique. It shows Emperor Akbar with his nine favourite courtiers seated on his either side. The names of the courtiers are written in

Persian characters (Left) (1) Raja Birbal, (2) Raja Man Singh, (3) Toder Mall, (4) Hakim Hammam. (Right) (5) Mullan Dupyaje, (6) Faizi (7) Abul Fazl, (8) Nawab Khan Khanna, (9) Mirza Gokuldas.

Babu Budh Singh, Jeweller of Patna city, will exhibit a jewelled sword of the Moghul Emperors. The tradition is that the sword belonged to the Moghul Emperors of Delhi. During the declining years of the Moghul Empire the sword somehow or other came into the possession of the Sikhs who presented the same to their Gurus and gradually came to be lodged in the *Sangat* of the Sikhs at Patna city, the birth place of the tenth and last Guru Govind Singh. At the begining of the British Period, during the unsettled state of affairs at Patna, the sword changed hands and was finally purchased by the ancestors of the exhibitor. The sword is made of finest damascene steel. The hilt is a fine piece of enamelled gold set with diamonds and rubies in oriental style, the top ending with a big pearl. The scabbard is also of gold with flowered engravings with enamelled end and 2 bands tastefully set with diamonds, rubies and emeralds to match.

Babu Bahadur Singh Singhi's exhibits contain among other things the following old valuable family jewels :—An emerald seal of Seth Sumar Chand, an emerald seal of Jagat Seth Kushal Chand and an emerald seal of Rai Hulash Chand, presented by Bahadur Shah the last Emperor of Delhi to Rai Hulash Chand, the great grand-father of the exhibitor on the occasion of conferring the title 'Rai' upon him.

The Nawab Bahadur of Murshidabad's collection contains some valuable books from the Palace Library

and a rare album of portraits of Ghori Kings prepared under the orders of the Emperor Shah Jahan.

Rai Bahadur Mani Lal Nahar who possesses a unique collection will exhibit some fine paintings of which those of Queen Nowshaba (Indo-Persian) with Alexander in disguise and Jodha Bai are the best.

Mr. A. Stephen's collection contains some fine paintings including the much-discussed picture of Akbar with his Christian wife. He will also exhibit some historical silver ware with a pair of Chinese vases said to have been presented with preserved ginger to the Emperor Aurangzeb by Emperor Kong Hi of China.

FINE ARTS.

The exhibits in the Fine Arts Section of the Calcutta Exhibition fall into two groups (*a*) Painting, (*b*) Sculpture. The former group again is divided into two sections, that relating to the Modern school, *i.e.*, works executed in the western method, and the indigenous Indian school. In the Modern school of exhibits, works on loan are also included. Some of the latter are of special merit, notably those executed by Mlle. Armond.

Among the local exhibitors of the modern school are such well-known names as B. C. Law, E. A. Harris, Atul Bose, H. Majumdar, F. C. Scallon, Satish Singha, and the late G. Jino. All these artists contribute works of merit, and are well represented. Added to this are some promising pencil drawings by students of the Government School of Art, which are of considerable interest.

The Indian section contains much that is worthy of very careful study. Well to the fore are pictures by D. Rama Rao and Rahman Chughtai, Jaminy Roy and many other artists of repute on this attractive style. On loan in this section are some Japanese paintings of Indian subjects of an intriguing nature.

The sculpture section contains few exhibits, but these are of no little artistic value, notably the productions of V. P. Karmarkar. Included in the group are some examples of industrial art, the work of Mahabir Varma aided by the students of the Government School of Art.

CHAPTER XIV.

ELECTRICAL INSTALLATION.

The whole of the Lighting Power Installation has been carried out by The Russa Engineering Works who are well known in Calcutta as a First Class Firm of Electrical Engineers.

The Consulting Engineers are Messrs. G. Bartholomew & Co. of 8, Dalhousie Square who have very kindly given their services free of charge in the designing and planning of the largest Electrical Installation that has ever been seen in Calcutta.

The supply and distribution of electricity has been carried out by the CALCUTTA ELECTRIC SUPPLY CORPORATION, LD., who have generously loaned to the Exhibition authorities the necessary materials required.

In order to meet the requisite demand, special arrangements have been made for the supply to the Exhibition to be directly connected to the Cossipore Power Station. A Sub-Station of considerable magnitude has been built in the Exhibition near the Auckland Road entrance and the necessary switchgear and transformers have been installed therein.

The supply is transmitted to the Sub-Station at a pressure of 6000 volts 3-phase Alternating Current and transformed down to 400 volts 3-phase and 225 volts single phase by means of two 450 K. V. A. oil cooled Transformers; five heavy overhead feeders have been erected from the Sub-Station to the various parts of the Exhibition.

In addition to the Alternating Current supply, Direct Current has been provided for the Engineering Section.

In order to convey an idea of the extent of the supply arrangements it may be mentioned that over 10 tons of bare copper wires have been utilized for the purpose of providing the supply.

CHAPTER XV.

ENTERTAINMENTS.

The south-west corner of the Eden Gardens lying between Strand Road, the Eden Gardens Road and the Lake, an area of about 275,000 sq. ft., has been allotted to entertainments. Within this area a site has been selected for a Stadium of dimensions about 300 ft. by 120 ft. capable of seating over 5,000 people and offering an interior area of about 80 ft. by 220 ft. which is suitable for the staging of a programme varying from Boxing and Wrestling to Assaults at Arms, Torch Light processions, Acrobatic displays, Buckjumping and other spectacular entertainments. This is in the hands of a special Sub-Committee and the details will be found below.

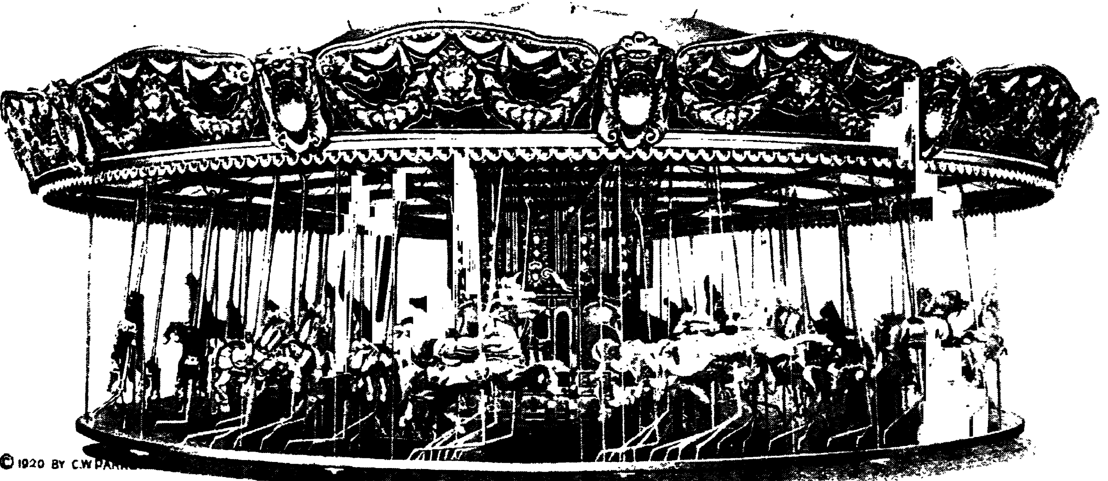
A Theatre has been constructed in which various types of Indian amusements, variety performances and miscellaneous entertainments, such as, Conjuring, Illusions, Archery, Ventriloquism will be shown. This Theatre is capable of seating 900 persons and a detailed account, with programme is found below.

The Exhibition has obtained the services of a large number of attractive entertainers found popular at most Pleasure Fairs such as Merry-Go-Rounds, Swings, Wheels, Chutes, etc., etc. The firm of M. Sen of Ballyganj is producing a combination of a Chute and the well-known Jharia Wheel—the property of the Raja of Jharia which has figured attractively at many melas. A new up-to-date Punch and Judy show has been

shipped direct from London and is guaranteed by Messrs. Whiteley & Company to be the best and fullest of its kind. Mrs. N. Campbell Rogers who is producing this is also conducting the well-known Human Spider illusion and the Magnetic lady; all are invited to shake this lady's hand and even rewarded for maintaining a good grip. On behalf of the Exhibition a most attractive form of Helter Skelter known as the Mountain Slide has been constructed by Messrs. Warren & Company..

On this, which is a strongly constructed tower of about 50 ft. in height with a strong searchlight radiating beams in all directions, A run-way is constructed round the outside whereby the passenger is shot round and round the tower at an increasing pace and is finally deposited with a bracing shock on the ground at the lower end. The revolving searchlight at the apex will radiate light beyond the confines of the Exhibition.

A contract has been concluded with a travelling exhibition known as "King Carnival" owned by Mr. Harry E. Handy. His show ranks as one of the biggest of all amusements now travelling in the East where it has travelled for 12 consecutive seasons without a break covering New Zealand, Australia, Java, F. M. S., Siam, China. It is now completing its seventh month in India having toured from Madras up the west coast and across India from Bombay. Mr. Handy's plant consists of the latest in amusements and presents the newest riding device direct from America known as "Aeroplane Swings" or "Sea Planes." This consists of a steel tower from which six life-like sea planes



THE GALLOPING HORSES.

are suspended by steel cables and swung out, each plane carrying four people. As the planes are rotated the increasing momentum gradually raises the height of the planes until the actual sensation of flying is given. Without being able indeed to "loop the loop," the swings can give a very satisfying suggestion of dipping.

A handsome Merry-Go-Round driven by a motor with 60 hand carved galloping horses is the only machine of its kind in the East, a device of eccentric axles giving a motion of galloping for which its owner claims that this item is unique.

The Kentucky Derby is also a guaranteed attraction. This presents a miniature race course in which 12 competitors each turn a machine and endeavour to win the race with the horse which is run by their respective machines. The race however is not to the swift for these machines have a device by which brute strength is defeated and cleverness has its opportunity. Mr. Handy is also showing the Great Palace of Illusions managed by Prof. Layard, the premier magician of Ceylon, who will produce remarkable illusions alleged never to have been seen in Calcutta before.

Jumbo the "biggest snake in captivity" is 28 ft. 6 ins. in length and weighs over a quarter of a ton. He lives exclusively on ducks consuming on an average 20 a week. Jumbo is alleged to be completely docile and to respond to petting like a dog.

In addition to these Mr. Handy shows the Venetian Swings, Razzle Dazzle, Slippery Slip, Duck Farm, Hoopla, Quoits, Shooting Galleries, Dart Galleries, etc., etc., the usual run of stalls and display booths too numerous to mention.

"The King Carnival Wild West" with Australian buck jumping horses and riders is an attraction that is sure to please. Any local horses that may be presented will be ridden and Mr. Handy will offer prizes to local riders who can ride the King Carnival horses for two minutes. He is confident that "Hero," the champion of all his buck jumpers, who has never been yet ridden by a stranger, will remain unconquered.

On behalf of the Exhibition a Shooting Gallery with a range of 75 ft. is being constructed. On this will be electric targets, running man and other difficult targets.

Mr. H. Smart Coulson is producing such old favourites as the Distillery, Charlie Chaplin, Jack in the Box, Ringing Coins, etc., etc., while other miscellaneous side shows such as Goal Kicking, Bucket Ball, Aunt Sally will completely fill up the area allotted for entertainments.

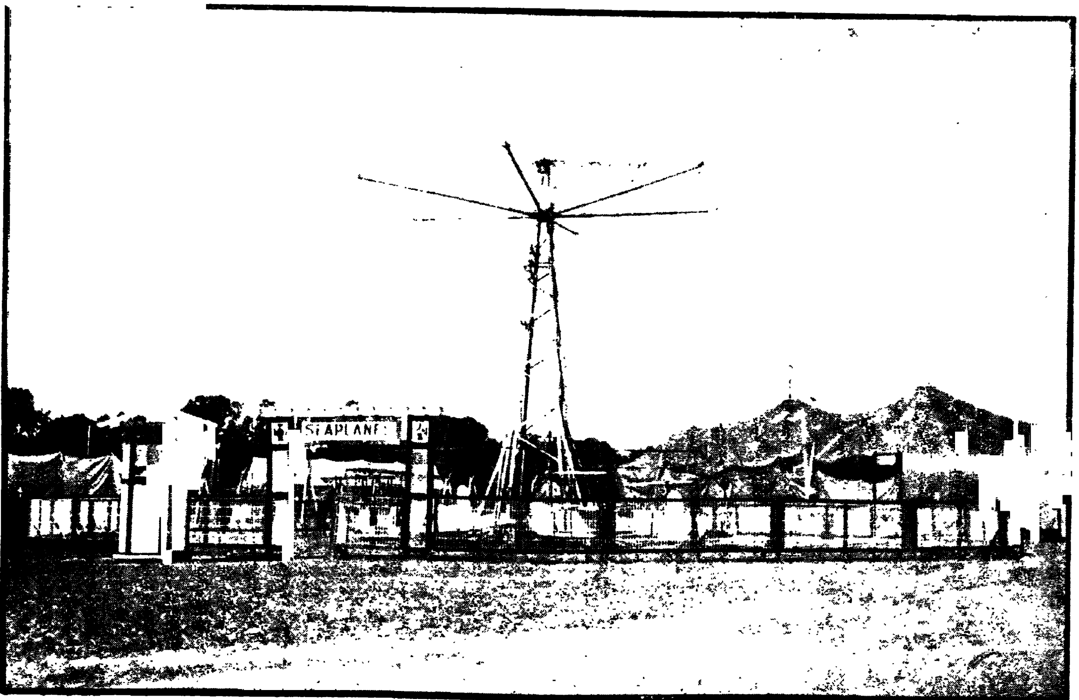
Music.—Outside the entertainment area a new Band Stand has been erected by the Exhibition at which the Bands of the Queen's Own Cameron Highlanders, 16/5th Lancers from Lucknow and the 4/8th (old 92nd) Punjabis from Alipore will play twice daily throughout the Exhibition. Arrangements are also in train for music on specially selected afternoons in addition to these Bands every evening and night.

The Indian Amusements will comprise of :—

(1) The Indian Variety programme, (2) Theatre and (3) Bioscope.

The Indian Variety programme—will include :—

(*a*) Indian Music, both vocal and instrumental, (*b*) magic, jugglery, black art, thought-reading,



THE SEA PLANES.

mesmerism, hypnotism, ventriloquism, etc., and (*c*) archery.

DETAILS OF THE INDIAN VARIETY PROGRAMME.

1. *Vocal Music.*—This will include different styles of Indian songs by eminent singers, *viz.*, Dhrupad, Kheyal, Tappa, Thumri, Gazal, Bhajan, Panchali, etc., as well as comic skits and sketches by the well-known Professor Chittaranjan Goswami and others.

2. *Instrumental Music.*—Talented artistes as well as amateurs will play upon various musical instruments, *i.e.*, Bina, Sarode, Surbahar, Sitar, Esraj, Kanoon, Jaltarang, Behala (violin) Saringi, Clarionet, Bansi (Indian flute), Nastarang (Vocal tubo-phone), harmonium, etc., with Pakhwaj, Tabla, Kartali and other accompaniments.

The following among other professionals have been engaged :—

Srijut Gopeswar Banerjea—Musician of the Burdwan Raj.
,, Radhikalal Goswami—Late musician to the Maharaja of Cossimbazar.
,, Lachmi Prosad Missra.
,, Amir Khan.
,, Chotai Khan.
,, Sital Chandra Mukherjee.
,, Bijoy Gopal Mukherjea.
,, Jitendra Nath Bhattacharjea.
,, Satya Kumar Banerjea.
,, Panchanan Chatterjea.
,, Ram Deb Pande.

Srijut Surendra Nath Das.
,, Umacharan Karmaker.

While negotiations are going on to secure Master Manhar Barve, aged 11 years, the grand musical prodigy of India.

The following gentlemen (amateurs) have kindly consented to give their performances.

Srijut Ramesh Chandra Banerjea.
,, Ghanashyam Mukherjea (Prince of Wales Gold medalist for violin play).
,, Narendra Nath Sen.
,, Sidheswar Das.
,, Rajendra Nath Chatterjea.
,, Durlav Bhattacharjea.
,, Nagendra Nath Mukherjea.
,, Govinda Rao.
,, Abdul Aziz.
,, Paresh Chandra Banerjea.
,, Pandit-Bisarad Nilkanta Bagchi.
,, Ram Nath Chatterjea—(musician to the late Maharaja Sir Jotindra Mohan Tagore).

3. *Magic etc.*—For this item of the programme, the Arya Variety Entertainment Co., Prof. K. L. Gossain, B. Gupta and the Friends' Necromantic Association have been engaged, while negotiations are going on with the world-renowned Conjuror and Royal Magician Prof. Kadir Bakhsh of Cawnpore.

4. *Archery.*—Prof. J. N. Mukherjea of Uttarpara will perform some of the most wonderful feats of archery like those in the Hindu Epics. He will also show some very mystifying and bewildering experiments, such as, "Marching on burning charcoal," Cataleptic walks, etc.

For the Theatrical Performances.—Mr. S. K. Bhaduri's Company has been engaged and some of the popular plays of Dr. Rabindra Nath Tagore and the late Dwijendra Lal Roy will be staged.

For the Bioscope shows, the Paris Cinema and Variety Co., Ltd., has been engaged and some of the choicest Indian as well as English films will be shown.

PALAIS DE DANSE.

All the world's a dancing. Young and old, grave and gay, men and women, boys and girls, all are slaves—and willing slaves to the fascination of the dance.

Calcutta is not behind the rest of the world, and the Exhibition affords to dancers in Calcutta and that is, to all Calcutta—a unique opportunity of enjoying their pastime under ideal conditions. The PALAIS DE DANSE occupies the north-west corner of the Exhibition grounds and the authorities have provided for their patrons the two essential features of, first, an admirable teakwood floor capable of holding comfortably 400 couples, and secondly, the best music available in Calcutta.

The floor is circular in shape, with a raised surrounding twenty feet in width, where will be served teas and refreshment to dancers. The decoration of the ball room—a scheme of purple and orange has been carried out by the firm of Nilmony Dass and Sons, under the supervision of Miss Enid Ballin and Pierre, who need no introduction to Calcutta folk.

There will be dancing twice a day: before dinner from 6 p.m. to 7-30 p.m. and after dinner from 9-30 p.m. to 12 midnight, hours which on Wednesdays and Saturdays will be extended to 1 a.m.

Music will be provided by the Pan American Band (by the courtesy of Mr. A. Firpo), the London Quartette (by the courtesy of Mr. Stephen), and a quartette newly arrived from England (by the courtesy of Mr. Peliti).

The PALAIS DE DANSE will have a separate entrance from Strand Road for the convenience of those who wish to dance without first traversing the entire length of the Exhibition grounds.

The catering is in the hands of Messrs. Firpo, Ltd., and the general management of the Palais de Danse with Miss Enid Ballin and Pierre.

The prices of admission are low—almost absurdly so in view of the attractions offered and range from Rs. 2-8 for a dance, (including tea) to Rs. 5 for after dinner dances on Gala nights.

The PALAIS DE DANSE will have the biggest and best floor in Calcutta—the best music in Calcutta, the best catering in Calcutta and the cheapest dances in Calcutta, so it is expected that large crowds will come and dance.

THE STADIUM.

The Stadium is situated in the south-west corner of the Exhibition grounds in the Amusement section.

Its purpose is to provide a place where shows, displays, sports, etc., may be staged.

The Stadium is an open air arena, oval in shape, 230 ft. long by 80 ft. wide, surrounded on all sides by ten rows of tiered seats capable of accommodating 5,000 spectators. It is so arranged that everyone will have a full view of the arena without obstruction. There are two main entrances for the lower prices seats at either end and one side entrance on the north for the higher prices seats in the centre. The south side entrance is for the use of the performers. On either side of the performers' entrance are dressingrooms, one for women and one for men. Large electric lights are strung across the Stadium making it possible to have night performances.

There will be three show-periods daily in the Stadium: Afternoons 3-30 to 5. Evenings 6 to 7-30, and nights 9-30 to 11. The Stadium Committee has endeavoured to arrange a varied programme of interesting, entertaining, amusing and instructive features of a clean and wholesome character.

Some Stadium Features.

1. *The Bracken Duo*:—Tight-wire balancing, trick juggling and other features.
2. *Indian Wrestling*:—Some of the best known Indian wrestlers of Bengal and North India will participate. This will be the only opportunity of seeing Indian wrestling for some years previous and to come. It is expected that Gama, the Champion of India will defend his title.

3. *Fire Works Display*:—The Orient Company will give an interesting display of ground fire works.
4. *King Carnival &Co.*:—This will be an exhibition of buck jumping by two famous Australian buck jumpers with five horses. Local horsemen will be given an opportunity to try their ability at sitting a bucking broncho.

    Motor jump by an Overland car—leaping a gap of 18 ft.

    The circle of death on a 35 ft. trapeze and diving from it into a net.

    Clowns, a wrestling bear, trick ponies and dogs.
5. *Girl Guides' Display* :—An exhibition of physical drill, group games, country dances, camp fire scenes and other activities of the Girl Guides' programme given by five hundred Guides of Calcutta.
6. *Boy Scouts' Display* :—An exhibition of the distinctive features and activities of Boy Scouting in India, by 500 Indian and European Scouts.
7. *St. John Ambulance Association*:—Final demonstration of First Aid to the Injured, Rescue and Ambulance work following the All-India competition held during the week.
8. *Civilian Boxing* :—Arranged by Flemming. Well-known and capable local boxers and others from outside Bengal will compete.
9. *Military Boxing*:—A good card of bouts will be staged by Major R. Campbell and will include some capable men from other parts of India.



THE HELTER SKELTER.

10. *The Lama Dancers of Thibet*:—An historical religious drama given in dance by fifty Lamas from Thibet. A unique opportunity to see this famous and interesting spectacle. It has only been given once before in Calcutta, when it was performed for H. R. H. the Prince of Wales.

11. *Basketball Tournament*:—An opportunity to see the most popular of American in-door games. A game which tests to the fullest the skill, stamina and speed of the players.

12. *Military displays* of a spectacular and interesting character given by the British troops of Calcutta.

A band will play for every evening and night performance. Watch for the full advertisements of these features.

VISIT THE STADIUM

THE INDIAN THEATRE

THE PALAIS DE DANSE.

PROGRAMME FOR DECEMBER.

Day	3-30—5 P. M.	6—7-30 P. M.	9-30—11 P. M.
Sat. 1st.	Unless otherwise noted,	Aerial Fight Wire balancing and Juggling by the Brackens.	
Sun. 2nd.	Championship, Indian Wrestling.	Nil	Aerial Fight, Wire balancing and Juggling by The Brackens.
Mon. 3rd.	Nil	Fireworks Display	The Brackens.
Tue. 4th.		The Brackens.	
Wed. 5th.			King Carnival Co.
Thurs. 6th.	3 P. M. Girl Guides Display	The Brackens.	
Fri. 7th.	Championship, Indian Wrestling.	Nil	Civilian Boxing Tournament.
Sat. 8th.	The Brackens.		King Carnival & Co.
Sun. 9th.	Championship, Indian Wrestling.	Nil	The Brackens.
Mon. 10th.		The Brackens.	King Carnival Motor Jump, Circle of Death.
Tue. 11th.	Nil	Fireworks Display.	
Wed. 12th.			The Brackens.
Thurs. 13th.			
Fri. 14th.	Demonstration of First Aid etc. by St. Johns Ambulance Asso.	Nil	Civilian Boxing Tournament.
Sat. 15th.		The Brackens.	King Carnival Motor Jump, Circle of Death.
16th.	Indian Wrestling.	Nil	The Brackens.
Mon. 17th.		Boy Scouts.	The Brackens.

Day	3-30—5 P. M.	6—7-30 P. M.	9-30—11 P. M.
Tue. 18th.		Nil	Military Boxing Tournament.
Wed. 19th.		Nil	Military Boxing Tournament.
Thurs. 20th.	Nil	Fireworks Display.	King Carnival Motor Jump, Circ Death.
Fri. 21st.	Indian Wrestling.	Nil	Military Boxing Tournament.
Sat. 22nd.	King Carnival, Motor jump Circle of Death.	Nil	Military Boxing Tour nament.
Sun. 23rd.	Indian Wrestling.	Nil	The Brackens.
Mon. 24th.	Nil	Fireworks Display.	The Brackens.
Tue. 25th.	Lama Dancers.	The Brackens.	Lama Dancers.
Wed. 26th.	The Brackens.	King Carnival, Motor Jump, Circle of Death.	Lama Dancers.
Thurs. 27th.		Lama Dancers.	
Fri. 28th.	Indian Wrestling.	Nil	Lama Dancers.
Sat. 29th.	Lama Dancers.	The Brackens.	King Carnival, Motor Jump, Circle of Death.
Sun. 30th.	Indian Wrestling.	Nil	The Brackens.
Mon. 31st.		King Carnival, Motor Jump, Circle of Death.	The Brackens.

This programme is subject to alterations. Daily programmes will be issued.

CHAPTER XVI.

MISCELLANEOUS.

Apart from the main sections of the Exhibition which have been already described there are numerous miscellaneous exhibits which classify themselves into smaller groups or stand alone as exhibits of their kind.

The Calcutta Improvement Trust provides a collection of great interest not only to the residents of Calcutta but to the visitors from outside.

The Calcutta Trust.
Improvement

The creation of the Improvement Trust was a consequence of the plague scare of 1906 when it was brought home to the people of Calcutta that in a city of narrow lanes and insanitary *bustees*, it would be impossible to fight an epidemic with any chance of success. The Improvement Trust was accordingly created in 1912 with the object of taking up the work of opening up congested areas improving communications and providing open spaces, the projects being financed trom the proceeds of a Terminal Tax on the Railways, a tax on Jute, a Stamp Duty on documents concerning the transfer of land and annual contributions from the Calcutta Corporation and from Government. The income from all these sources is now about 35 lakhs, one-third of which represents the contribution of the Corporation.

From the first the Improvement Trust saw the necessity of a wide thoroughfare running through the City from North to South and they designed a road which will run when completed from the Chitpore

Bridge on the North to the Southern boundary of Calcutta, a distance of 7 miles including 1½ miles of Chowringhee Road. Of this road 1½ miles have been finished and opened to traffic in Central Avenue and two miles in South Calcutta and the construction of the remainder is being pushed on.

In all 22 miles of roads have been constructed of which 12 have been handed over to the Corporation and the programme of the Trust contemplates the construction of a further 33 miles of main roads in addition to a larger mileage of subsidiary roads.

A crying need of Calcutta is good bridges of adequate width. Every visitor to Calcutta has this defect brought to his notice when he crosses the Hooghly Bridge from Howrah on the West. The inadequacy of the bridges is equally a great hindrance to traffic on the North, East and South on the roads leading to Cossipore Chitpore, Manicktolla and Alipur. The Trust are at present constructing a bridge over the Circular Canal which will, with its 37 feet roadway and two 10 feet footpaths, give ample accommodation for the traffic using the Dum Dum Bridge. The bridge will be the first re-inforced concrete bridge to be built in Calcutta and it is in the nature of an experiment, as, if it is found to be a success, other bridges of the same type will gradually replace the antiquated and inadequate structures now in existence. A model of the new bridge is shown.

As in large cities with a steadily increasing population the housing question is a difficult one to solve in Calcutta. Attempts by the Trust to provide *chawls* and dwelling houses have been unsuccessful and it has been found more satisfactory to sell building sites along

the new roads on which people construct their own houses. In the South of Calcutta many hundreds of such sites are rapidly becoming available for building.

At present the activities of the Trust are limited by the boundaries of Calcutta but it is proposed to extend its scope to the suburbs for the purposes of regulating the development of the areas outside Calcutta especially in the direction of aligning main roads.

Public Health.

The exhibits of the department of Public Health will be found to be of absorbing interest and Dr. Bentley and his assistants have taken the usual pains to make this stall a success. Information or statistics etc. relating to the public health of Bengal are readily available and all enquiries will be welcomed.

The following is the list of Exhibits for the ensuing Exhibition :—

Section I. (*a*) Posters :—Malaria, Kala-azar.
(*b*) Models :—Mosquitoes.

Section II. Posters :—Child Welfare and Baby Clinic.

Section III. (*a*) Posters :—Foods and their constituents.
(*b*) Exhibits :—Foods and their adulterants.
(*c*) Demonstrations :—Pure food.

Section IV. (*a*) Posters :—Cholera.
(*b*) Models :—Howrah Chinsura Water Works.
Sweetmeat Shop. Septic Tank.
(*c*) Demonstrations :—Pure water.

Section. V. (*a*) Posters :—Hookworm, Small-pox, Tuberculosis.

(*b*) Models .—Hookworm Patient; Housing arrangements for labour population in mill areas.

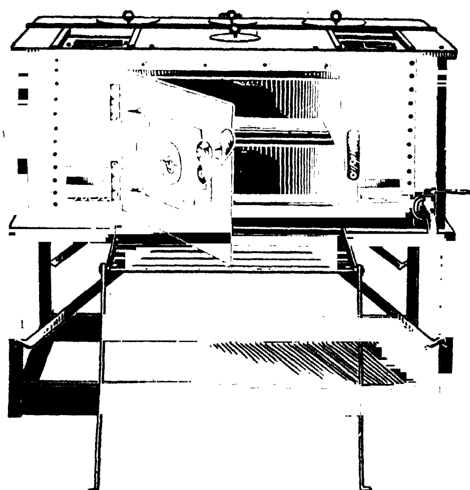
(*c*) Demonstrations :— Microscopic. Hookworm and other slides.

Cooking Stores, etc., filters, ovens etc.

A group of exhibits which will prove very interesting is to be found towards the south east of the grass ride, where cookers suitable for Indian conditions will be demonstrated. The well-known Ic-mic cooker will be on view and the Cocoon Cooker & Co. of No. 3, Central Avenue, Calcutta will present demonstrations of the working of their exhibit. The Ic-mic cooker is the patent of Dr. I. M. Mallik. Its working will be demonstrated at frequent intervals, and it will be found in stalls, Nos. 465, 467 and 634. The Cocoon cooker will be found in Stall No. 630. The Julius Stove Manufacturing Co. are displaying an exhibit which is of special interest to Europeans and indeed to all, in stalls, Nos. 633 and 635. These patent stoves claim to be the only stoves in India to cater for the fuel of India. It has been said to effect a saving of 50 per cent. in fuel consumption and the fuel used in this connection is guaranteed to produce a supply of hot water for baths and cooker purposes. These stoves have been in great demand amongst regimental messes, clubs, hotels and private houses etc. A special model, the Baby Julius, recently been brought out. The firm is also exhibiting

has many other useful articles, such as hot cases, portable sinks and furniture. Daily demonstrations on the use of this cooker will be given and it is expected that this will make a great appeal to up-country visitors.

The Julius Stove



Messrs. A. Brault & Co. of 7/1, Wellesley Place, Calcutta, exhibit petroleum lamps, stoves etc., in Stall No. 632 and demonstrate their working.

The exhibits of Messrs. Das & Co. in stalls, Nos. 453 457 and 459, consisting of filters, ball cocks, filtration plants, baking ovens etc. may also be mentioned here, as also the exhibits of Messrs. Elliott & Co. of 7-A, Clive Row, Calcutta, in stalls, Nos. 626 and 628, which consist of kerosine oil, and lanterns of the Dietz pattern.

Mr. Ramgopal Dhar of 123, Sankari Bazar, Dacca, exhibits the well-known conch shells of Dacca

together with mother-of-pearl articles set with gold and ruby, in Stall No. 234.

Amongst food products Messrs. Ahmuty Co. of 30, Strand Road, Calcutta, will be showing in Stall No. 128 their well-known evaporated milk and canned provisions. Messrs. The Britannia Biscuit & Co., Henley House, Calcutta, a manufacturing business which has come to stay in India and which has already made great strides, will show their products in stalls, Nos. 149 and 150. Messrs. Lipton & Co., Ltd., the world-renowned provision people are exhibiting in Stall No. 155. Messrs. A. Firpo & Co., Ltd., have an attractive show of confectionery, chocolates and cakes in stalls, Nos. 68, 69 and 70. The Pioneer Condiment Co., Ltd., of 81, Harrison Road, in stalls, Nos. 109 and 110 have put up an array of food products, preserved fruits, jams, jellies, syrups, condiments, arrowroot, soti and sago and Indian sweets, which will well repay examination. Messrs. Parry & Co., of 11, Clive Street, Calcutta, in Stall No. 111 display confectionery of fine quality. Messrs. P. Sett & Co., of 13, Ram Narain Bhattacharjee Lane, Calcutta, in stalls, Nos. 98 and 99 have specialised in biscuits. Messrs. D. Writer & Co., of Arab Lane, Corner Grant Road, Bombay, have come all the way to Calcutta to exhibit their tinned and bottled confectionery in Stall No. 97. The Bengal Canning and Condiment Works Ltd., Ultadanga Main Road, Calcutta, have taken 3 stalls, 100, 101 and 106 in which their well-known preserved fruits and vegetables, jams and jellies etc. will be displayed. Messrs. Keymer, Bagshawe & Co., Ltd., 5, Mangoe Lane, Calcutta, are displaying in Stall No. 146 raisins and currants in various packets

Food products.

packed by the Sun-maid Raisin Growers Association of California, United States. Messrs. Allen and Hanburys Ld., Clive Buildings, Calcutta, have two very striking stalls, Nos. 144 and 145 with their well-known food products. Mr. R. F. Arnold, 58, East Range, New Market, Calcutta, displays lard, sausages etc. in stalls, Nos. 102 and 103, and Messrs. H. Tila Mahomed and Bros., 66, New Market, Calcutta, exhibit fresh and dry fruits in Stall No. 104. Mr. Harinarayan Gopinath, Khari Busti, Delhi, in Stall No. 105 has shown preserved provisions and Indian condiments. The Armenian Relief Society C/o. Mrs. Apcar, 5, Loudon Street, Calcutta, has taken Stall No. 148, where sweets and flowers will be shown and Messrs. Muller and Phipps Ld. of 21, Grosvenor House, have taken 6 stalls, Nos. 154, 156, 157, 158, 159 and 160, in which their high class toilette articles, provisions and condiments are displayed to great advantage and are well worth careful examination. Messrs. Sree Kissen Dutt & Co. of 121, Dhurrumtolla Street, Calcutta, are also exhibiting Indian condiments and provisions in stalls, Nos. 231 and 233. Messrs. Badalram Lachmi Narain of 144/A, Harrison Road, Calcutta, are showing *zarda* and *surti* in stall No. 527.

Music, Statuary, Pictures, photography etc.

The Italian Fine Art Gallery, 130, Mechua Bazar Street, Calcutta, have taken 3 stalls, Nos. 124, 125 and 126 in which marble busts and statues and other marble works by Prof. Mario Vitti of Florence, Italy, are shown. These are real works of art and they will be found to be very attractive. Mr. M. Sain of Darjeeling shows in stall No. 117 his famous Himalayan views and pictures of Himalayan characters in all sizes and colours.

The work of this artist is well-known to all visitors to the hills but its exhibition in Calcutta will certainly be welcomed.

Books and pictures are shown by the Association Press, 5, Russel Street, Calcutta, and pianos by Messrs. Misquith Ld., 279, Dalhousie Street, P. O. Box. No. 5, Rangoon. The latter company has taken two stalls, Nos. 112 and 113. Messrs. Bevan & Co's stall is another exhibit by a Calcutta firm which should be seen. Messrs. Wong Quin & Co., 62, Metcalfe Street, Calcutta, show works of the great Chinese wizard in stalls, Nos. 114 and 115, where many flour figures in natural colours will be produced while the visitor waits. The Calendar Manufacturing Co. of 54, Canning Street, Calcutta, have a great display of calendars and show-cards in stall, No. 127, and in stall, No. 116, Capt. P. K. Gupta, 101-C, Masjidbari Street, will exhibit pictures and oil paintings of considerable merit.

Toys.

There are several stalls in the Exhibition exhibiting toys. Messrs. A. J. Shellim & Co. of No. 4, Clive Buildings, Calcutta, have 3 stalls, Nos. 636, 638 and 640, where rubber balloons of attractive colours manufactured by the Oak Rubber Co. of the United States, will be shown. Messrs. Peston Chickgar, Victoria Road, Karachi, have 3 stalls, Nos. 214, 216 and 218 with toys of all descriptions, fancy boxes, figures and lamp stands. The Pioneer Toy Mart of 10, Old China Bazar Street, Calcutta, in their stall, No. 477 display foreign and Indian toys. Mr. Ali Mahomed of 22/1, Lower Chitpore Road, Calcutta, shows gas filled toys and rubber balloons in stall No. 462.

Fancy goods will be found in many stalls. Messrs.

Laurel Novelty Co., 48, Radha Bazar Street, have a very large display in stalls Nos. 228, 230 and 232 where fancy electric goods, leather goods, canvas, paintings, porcelain and ivory goods etc. are displayed.

Fancy Goods, Jewellery, curios.

Messrs. Jaji Asgar Mir of 178, Harrison Road are showing wood carvings and other novelties and shawls in stall No. 227. Messrs. F. N. Gooptu & Co. of 12, Beliaghata Road, Calcutta, in stalls Nos. 469 and 471 are exhibiting their well-known pen holders, pencils, fountain pens etc. Mr. H. A. Monnaf of G. 2, Municipal Market, Calcutta, exhibits in stall No. 303, jewellery, embroidery, knitted articles etc. Messrs. Hopechand Motumall of 122 and 123, New Market, Calcutta, in the next stall, No. 304, are showing silks, curios and brass wares. Messrs. Matri Bhandar of 206, Cornwallis Street, also exhibit conch shell work as well as ivory articles, Krishnagar figures and jewellery etc. in stalls Nos. 194, 196 and 198. Messrs. Gokuldas Gobardhandas of 53/54, Khengraputty, Calcutta, are showing their silk and ivory goods in stalls Nos. 222 and 224. Mr. D. M. Ishak of 125, North Range, New Market, Calcutta, in stall No. 197 has a display of necklaces, bead bags, girdles, brooches and fancy goods of all descriptions. Messrs. N. Gupta and Sons. of 5, Gupta Lane, Beadon Square, Calcutta, have taken stall No. 446 to show watch chains, buttons, studs and other articles of jewellery. Babu Monohar Chandra Roy of 18, Shibtolla Street, Daccaputty, Calcutta, has taken stalls Nos. 207 and 209 and has a very fine display of jewellery and ornaments. Messrs. Punchi Singho Bros. of 19-A, Queen Street, Fort, Colombo, P.O. Box, 186, Calcutta, in stall No. 409 are showing

Ceylon goods of tortoise-shell, porcupine quill boxes, carved cocoanut shells and other articles representative of Ceylon. The Dacca Industries Home, College Street Market, are showing Dacca muslin, conch shell articles etc. in stall No. 448. Mr. B. K. Damani of 29 Durpo Narayan Tagore Street, Calcutta, in stall No. 454 is exhibiting jewellery work in rolled gold, watches, toys etc. Messrs. S. C. Bose & Sons. of 81, Clive Street, Calcutta, are showing in stall No. 456 imported goods, various kinds of toys, sundries, lanterns etc. The East India Button Manufacturing Co. of Dacca, 55/13, Canning Street, Calcutta, are showing horn and brass buttons, safety pins, and earrings etc. in stall No. 458. Mr. Ramgopal Dhar of 123, Sankari Bazaar, Dacca, exhibits his well known conch shells of Dacca together with mother-of-pearl articles set with gold and rubies in stall No. 234.

Perfumery, Medicines, and toilet requisities.

Dr. S. K. Burman of 5, Tarachand Street, Calcutta, has taken stall No. 532 for patent medicines and toilet requisites. Messrs. Gobin Lall Mullick & Sons of Upper Chitpore Road, Calcutta, in stall No. 520 show patent medicines and fruit syrups. The Indian Soap Co. of 64/1, Mechua Bazar Street, in stalls, Nos. 522 and 524 have their soaps and perfumery on display. Messrs. Gobindram Kahanchand of 31, Lower Chitpore Road, Calcutta, are exhibiting their 'Amla' hair oil, perfumery and soap, etc. Messrs. Magbool and Co. of Lower Chitpore Road, Calcutta, in stalls Nos. 523 and 525 have their exhibits of perfumery and zarda. Mr. B. K. Banerjee of 12, Nebubagan Lane, in stall No. 526 are exhibiting perfumes of all kinds. The Mysore Agency

of 99, Garpar Road, Calcutta, in stalls Nos. 474 and 476 are showing sandal-oil, scents sandal-wood dust, soaps, as well as white paint, white lead, blankets and silks and art works. The Mohini Agency of 54, Canning Street, Calcutta, in stall No. 531 are exhibiting perfumery. Messrs. A. H. Khan Bros. of 54, Canning Street, Calcutta, are showing perfumery and zarda. The Marwari Relief Society of 7/1, Jogomohan Mullick Lane, Calcutta, have taken stall No. 547 where a very interesting display of Ayurvedic medicines is to be seen. *Til* oil is shown by Messrs. G. Ghosh & Co. of 221, Upper Chitpore Road, in stall No. 545. Kaviraj N. N. Sen of 181, Lower Chitpore Road, in stalls, Nos. 534 and 536 is showing his well-known Keshranjan and Surama hair oils and scents and Ayurvedic medicines. Mr. S. Chatterjee of 17, Rama Prosad Roy Lane, in stall No. 538 is exhibiting perfumery. The Jewel of India Perfume Co. of 19-A, Srigopal Mullick Lane, Calcutta, in stall No. 537, are showing perfumery and stationery. The Scientific Suppliers (Bengal) c/o—Mr. P. C. Chatterjee of 29/32, Cornwallis Street market, Calcutta, in stall No. 528 shows scientific apparatus, models of laboratory tables, chemicals for fire proofing and for the match industry, soaps, scents, etc., and in stall No. 548 Messrs. W. A. Hogan & Co. of 4, Waterloo Street, Calcutta, have medicated lozenges, tinctures, tablets, medicines, etc. The Oriental Soap Factory of 9/2A, Peary Mohun Sur's Lane, are showing their soap-toilet and washing soap-in stall No. 551. The Calcutta Soap Works of 8, Canning Street, Calcutta, are exhibiting their glycerine and toilet products in stall. No. 529. Messrs. P. M. Bagchi & Co. of

16/1, Sukeas Lane, Calcutta, are exhibiting ink, scent, perfumeries, etc. in stalls Nos. 543 and 549.

Messrs. Allibhoy Vallijee & Sons of Multan Cantonment, (7, Bowbazar Street) in their stalls Nos. 478 and 480 have a display of despatch and dress boxes, aseptic hospital furniture and appliances. Messrs. K. N. Poddar & Co. are showing steel trunks umbrellas and sola hats in stall No. 295. Messrs. M. Lawrin & Co. of 154, Upper Circular Road, Calcutta, have two stalls Nos. 408 and 418, in which they exhibit iron safes. Messrs. Ghulam Hussain Ismailjee and Bros. of 287, Hornby Road, Fort, Bombay, are exhibiting tinned steel despatch, cash and deed boxes, trunks and dress and suit cases in stall No. 486. The Apollo Furnishing Co. of 137/1, Cornwallis Street, Calcutta, in their stall No. 482 exhibit iron safes and furniture. The Bharati Factory Ld., 141, Masjidbari Street, Calcutta, are showing their steel trunks, cash boxes and other hardware goods. Mr. P. N. Mukherjee of 120, Sovabazar Street, Calcutta, displays iron safes, locks, padlocks, etc. in stalls, Nos. 410 and 413.

Despatch boxes. Safes, trunks, locks, etc.

Hardware.

The stalls of the Calcutta Pottery Works, 45, Tangra Road, Calcutta, are Nos. 473 and 475 and here the products of this recently established and most successful industry are displayed in a very attractive way. In stall No. 403, which has been taken by Mr. Rajani Kanto Sanyal, 1, Portuguese Church Street, Calcutta, there will be found a very valuable display of old Venetian cut-glass articles, old China ware, gold and silver embroideries and general curios. Mr. G. P.

Pottery, Glass etc.

Ghose of the Fire Bricks and Tiles Syndicate, 55, Raja Dinendra Street, Calcutta, has three stalls, Nos. 455, 461 and 463, in which a great display of pottery works, clay goods, figures and statues is given. The Gwalior Potteries Ld., 257A, Bowbazar Street, are showing chinaware.

Stationery and books.

Messrs. Kalamazoo Ld., c/o, Chartered Bank of India, Australia and China, 86/1, Clive Street, Calcutta, are exhibiting in stall No. 226 their Kalamazoo Kalamazet and Noreta loose leaf books, and Mrs. Claudine Mary Landale, 2, Turner Street, Calcutta, has on show in stall No. 406 a very valuable collection of old books on India, pictures of India and miscellaneous curios.

The Standard Literature Company, Publishers, of 33/1, Old Court House Street, Calcutta, have a stall which will prove very attractive. They are especially proud of their 'Book of Knowledge,' the 12 volumes of which are on exhibit, and an examination of the book in their stall will show that there is justification for their pride. It is claimed to be an ideal book for the young and a million and a quarter sets are said to have been sold. It is expected that many sets of the book will be sold in the Exhibition as Christmas presents for children. The whole of this exhibit is of a high standard. Their 'Popular Science' series especially, which is not nearly so well-known as it ought to be in view of the valuable educative material it contains, should be examined by the visitors. Shakespeare, Dickens and Thackeray, Calcutta's own son, Coleridge, Tennyson, Longfellow, Scott, Wordsworth,

Byron, Kats, Shelley and Browning are all here. The Standard Dictionary and Harmsworth's Universal Encyclopædia are also on show and many of the finest technical books published, including works on Engineering, Electrical, Civil, Steam and Gas, Automobile, Telephony and Telegraphy, Sanitary, Heating and Ventilation are also displayed in the Company's stall.

There is no literary taste which will not be satisfied with this exhibit, and the excellent system of monthly subscription payments which the firm has arranged will doubtless ensure them many more customers.

A very restful half-hour can be spent in this stall.

Photo Cameras etc.

Messrs. J. F. Madan & Co. in two stalls, Nos. 229 and another are giving exhibits of their photo cameras, cinemas, bioscope machines, etc.

Galvanized brass and copper goods.

The Indian Wire Netting Factory of 7/15, Narkeldanga Main Road, Calcutta, are exhibiting wire netting and articles made of wire, galvanized brass, copper, etc. in stall No. 444.

Cloth, Benares cloth, Dacca and Santipur cloth etc.

The Ranjit National Stores of 213, Bowbazar Street, Calcutta, in stall No. 156 are displaying khaddar, shawls and Benares, Dacca and Santipur cloths. Messrs. Harsookdas Thakurdas, 26, Khengraputty, Calcutta, have a striking collection of Benares cloth and shawls in stalls Nos. 204, 206, 208 and 210, and Messrs. Charandas Harnaindas of 37, Cross Street, Calcutta, have two stalls Nos. 219 and 221 of a similar kind. Benares cloth is also to be found in stalls Nos.

215 .and 217 exhibited by Messrs. Sambhu Nath Ramlal of 36, Khengraputty, Calcutta. The Mohini Mills Ld., of Kushtia, Bengal, in stall No. 297 are exhibiting their cotton textiles which are so well-known in this province. Messrs. Radha Kissen Bharamy and Bishundas Bharamy, Half Gate, Amritsar, have two stalls, Nos. 240 and 242, in which they have a very attractive exhibit of shawls, carpets and pictures. Mr. Jagannath Nathmall, 37, Khengraputty, Calcutta, is exhibiting Kashmir embroideries, silk and shawls, etc., of great beauty in stall No. 220, and in stall No. 299, Messrs. Mahbub Ali Abdulla & Co., P. O. Champanagar, Bhagalpore, are showing Bhagalpore tussore and silk cloth of various kinds. Messrs. Vithaldas Choonilal Jariwala, 95/99, Bhooleswar, Bombay, have a most attractive exhibit in stall No. 301 consisting of silk fabrics and gold and silver embroideries. Dacca muslins, jewellery and embroideries are on exhibit in stall No. 205 by Messrs. S. N. Roy and U. N. Roy of 26, Shibtolla Street, Calcutta. Mr. Joy Kissen Das of 12, Boloram Dey Street, in stall No. 416 is exhibiting general piece-goods.

Ornaments in ivory, horn etc.

Ivory, horn goods and jewellery will be found in stall No. 472 exhibited by the Swadeshi Silpa Factory of 212/1, Cornwallis Street, Calcutta. The Bengal Industrial Company of 57, Russa Road South, Calcutta, in stall No. 212 are showing ornamental work in gold and ivory and conch shell, etc. The Calcutta Horn Manufacturing Co., of 91/C, Sambhu Babu Lane, has taken stall No. 470 to show their horn goods, hair, brushes and shaving brushes, etc.

Sporting goods are on exhibit by the Calcutta Sports Depot, 7, Kyd Street, Calcutta, and by the Continental Sports Co., 3, Chowringhee Road, Calcutta, in stalls Nos. 631 and 637. Tiles will be found exhibited by the Sorabdalal Tile Works, Khanpur Road, Ahmedabad, in stall No. 479. Roofing and ridge tiles,—Mangalore type,—crucibles, side and end flue covers, drainage and sanitary pipes will be found here.

Sporting goods.

Instruments and appliances for surgical and other requirements will be found exhibited by Messrs. Ghulam Nabi and Sons, 51, Hospital Road, Lahore, in stall No. 484; and the P. G. S. Works, Ld., Post Belgachia, Calcutta, are showing scientific apparatus in their stall.

Scientific appliances.

The Continental Import Co., of 4, Mission Row, in their stalls Nos. 236 and 238 have a variegated display of musical instruments, razors, shaving sets, magnetos, plugs, lanterns, etc. The National Lock and Engineering Co., 8, Ezra Mansions, Government Place, Calcutta, in stall No. 513, are showing iron and brass hinges, tower bolts, flush bolts, chest handles, door bolts, etc.

Messrs. Adam Sajan & Co., of 7, Bowbazar Street, Calcutta, in their 4 stalls, Nos. 512, 514, 516 and 518, have a very representative display of furniture, artists' cabinets, rich tapestry and glass and electric chandeliers, etc. Messrs. J. E. Tomlin & Co., 32, Dhurrumtolla Street, Calcutta, in their stall No. 511 and part of stall No. 509 are showing furniture. Messrs. P. Engineer & Khusro Mirza of 91, Lower Circular

Furniture.

Road, Calcutta, are showing paintings of China and Persia and brass and Tibetan ware and general curios.

Furniture will be found in the stalls Nos. 199 and 201 of Messrs. Army and Navy Co-operative Society, Ld., 41, Chowringhee Road, Calcutta, as well as their grocery, confectionery, cigarettes, photographic appliances, games requisites, dress materials, etc. Messrs. R. G. Bansal & Co., 339, Kasairat Bazar, Agra, United Provinces, have taken stall No. 411 in which they exhibit furniture and objects of building. Messrs. P. Raghoram & Son, Srinagar, Kashmir, (71, Colootolla Street, Calcutta), exhibit Kashmir stone ware, embroideries, carpets and curios, etc. Messrs. Lassoo & Sons, C/o Grand Hotel, Calcutta, have an excellent exhibit in stalls Nos. 246 and 248, of Kashmir goods, wood carvings and embroideries. Messrs. Singh Sarkar & Co., of 105, Harrison Road, Calcutta, have two stalls Nos. 412 and 414 for their display of safes, watches, clocks and photographs.

Cutlery, enamelled ware etc.

Cutlery and brushes will be found in the stall of Messrs. J. J. Headwards & Co., 4, Commercial Buildings, Calcutta, in stall No. 468 and enamelled ware and sign plates are exhibited by Messrs. Soor Neogi Coomar & Co., 39, College Street, Calcutta, in stall No. 466. Enamelled ware is also on exhibit in stall No. 451 by the Bengal Enamel Works, Ld.

An interesting exhibit is that in stall No. 535 in which Dr. G. K. Sawday, 42, Dhurrumtolla Street, Calcutta, is showing dental treatment.

Mr. L. F. Jacquin, 23, Wellesley 2nd Lane Calcutta, has a stall No. 460 replete with toys and

chocolates which should make a special appeal to the public at Christmas time.

Messrs. Hennessey Bros., & Co.'s stall No. 452 contains drappery, crockery, sports, motor car novelties and rubber heels while Messrs. Sircar Bros., 66, Russa Road North, Calcutta, are exhibiting leather goods in another stall.

The stall of Messrs. T. E. Bevan & Co., Grosvenor House, Calcutta, is of special design. It contains a very interesting display of music books and musical instruments, pianos; gramophones, magnavox, violins, etc., and a very comprehensive selection of gramophone records. This will well repay a visit.

The Indian Tea Cess Committee's stall is a large building off the grass ride towards the southern extremity and it is selling tea, cakes, biscuits. The prices at which the Committee are selling tea are very low and the manner in which the whole stall is turned out will be found to be very efficient.

Messrs. Edward Keventer Ld., P. O. Dairy Farm, Aligarh (6, Lindsay Street, Calcutta), have also special stalls displaying their products and demonstrations of milking. Cows are milked by their machine everyday at 4 o'clock

Newspapers.

The *Englishman* and the *Statesman* newspapers have stalls of their own where newspapers will be on sale.

Sweetmeats.

There are quite a collection of sweet meat shops and minor restaurants. Mr. S. Mukherjee & Co., C/o. Burdwan Cycle Works, Barabazar Road, Burdwan, exhibits especial Burdwan sweets. Marwari sweets are exhibited by Messrs. Champalal Vyas, Puran Chandra Agarwalla,

Ram Nath Sarma and Babulal Sarawajee, and also by Ranglal Dalmia.

Sweet meat and *pan* stalls have been opened by Messrs. Nyrod & Co., 181, Harrison Road, Calcutta.

Pan shops by Sitaram Baroi, Debi Sha, Meeghu Routh, Ganesh Routh, Ramdhani Ram and Nanku Upadhya are to be found in the stalls, and *chanachur* is to be had in the stall of Sakichan Shao and Dwarka Lall Shaw. *Pan* stalls have also been opened by Chagiram Gauri Sankar, Basanta Singh and Misri Lall Biswas.

Restaurants.

Restaurants are maintained by Babu Chaitanya Chandra Ghosh, 2, Raja Rajballav Street, Calcutta, The Orient Cabin, and by Ruplal Hukumatrai.

The International Restaurant and the Minerva Restaurant. These are small restaurants; the International being the larger. But in addition there is a still larger restaurant known as the Lyon's Cafe and Grill. It will probably prove to be of great convenience.

Temperance.

The Calcutta Temperance Federation of 27, Dhurrumtolla Street, Calcutta, were not slow in availing themselves of the opportunity which the Exhibition offered for their propaganda. The work of the Temperance Federation is well-known and is spreading. Some idea of the work that has been done by them will be given by the Temperance literature in the various languages of India, and the representations of specimens of organs of human bodies showing the effect of alcohol on them, which the Federation are showing in their stall No. 437.

The Bengal Telephone Co., have set up a

separate exchange in the Exhibition, which, as an exhibit in itself, is worth examination.

Telephones.

Telephone connections have been made to numerous stalls and they will prove a novelty and a convenience. The Exhibition Telephone directly is appended to this Guide Book.

Jails.

The Jails Exhibit illustrates the work done in Calcutta jails.

APPENDIX A.

THE TRADE OF CALCUTTA FROM THE EARLIEST TIMES.

The three villages, Sutanati, Kalikata and Govindpur, which formed the nucleus of our great city, to be greater still when the Calcutta Municipal Act passed by the Reformed Council of Bengal comes into operation, were not unknown in legend and history, when during the reign of Aurangzeb in 1690 the English fixed upon them as the best site for a fortified settlement from which to carry on once more their trade in Bengal.

Two years before, owing to the growing hostility of the Moghul rulers which had precipitated an open conflict with the Moghul forces, the whole of the Company's establishment in Bengal under the leadership of Job Charnock had to withdraw from Hooghli, the principal port of Bengal at that time and the head-quarters of the English settlement in the Bay.

Landing of the English in Calcutta.

They "tripped from port to port" and after many wanderings and a sojourn in Madras for a time Job Charnock and his men returned to Bengal in response to an invitation from the Nawab extended at the instance of Aurangzeb himself and landed at Sutanati.

Their period of wandering was marked by many daring feats at Hijli, an important trade-mart at the time and the principal seat of salt manufacture in Lower Bengal, and at Balasore, but it also saw a futile attempt to explore the possibilities of carrying into execution the ideas of the Court of Directors to seize Chittagong and to make it the principal head-quarters

of the English settlements in the Bay. For some reason or other the Court of Directors knowing little of the requirements of the trade in the Bay and, perhaps, still less of the geography of Bengal, came to the conclusion, in spite of the advice given to the contrary by their local agents, that all would be well in the Bay if the ports on the Hooghly were abandoned and Chittagong was captured and made the principal seat of their trade. The history of the British Empire in India would undoubtedly have been different if this plan had succeeded but fortunately the indecision and incapacity of the officer entrusted by the home authorities with the execution of the task succeeded in frustrating their object, to convince them of the futility of which the reasoning and remonstrances of the local officials had failed. The Great Moghul in asking his Viceroy of Bengal to send out the invitation to the English to return was not unmindful of their audacity and impudence in venturing upon open hostilities with him. He thought more, however, of the commerce which enriched his treasuries and which he could not well afford to lose and he merely acted in accordance with the old adage that it is not wise to kill the goose that lays the golden eggs.

Calcutta—in legend and history.

It is natural that the veneration in which the Hindus hold the temple of Kalighat, sheltering as it does, in its bosom the toe of *Sati,* which fell from her mangled corpse in heaven in the far off age of Truth (Satyajuga), has gathered round it many legends and traditions. The very name of Calcutta is derived according to tradition from Kalighat, which is a corruption of Kalikeshtra. Calcutta first finds a place

in history when Pratapaditya, the great national hero of Bengal, whose efforts to promote peace and concord among his Hindu and Mahommedan subjects are still evidenced by many ruins in the Sundarbans, rarely however visited by antiquarians on account of their inaccessibility, built several forts near it on the advice of the Portuguese Commander of his fleet, as frontier stations against Moghul attempts to thwart his efforts to set up an independent kingdom. It also began to acquire an importance of its own in the 16th century owing to its proximity to Betor (Shibpur) on the opposite side of the river, where an important market had sprung up as the river became shallower and riskier for the galliasses of the Portuguese to go higher up. This market at Betor attracted the attention of traders but some of them chose Sutanati and Govindpur and settled there as a more convenient place for transacting business with the foreigners who frequented the opposite side of the river, and in time the foreign market at Betor came to be transferred to Sutanati. Thus when the English came, Sutanati had already become an important place of trade.

Retrospect.

The initiation of the Company's trade with Bengal was due to their agents at Muslipatam who, faced with a growing scarcity of articles of export, resolved to explore the conditions and prospects of the trade in the fertile province at the mouth of the Ganges and to effect a permanent settlement there. "First, for the trade 'twixt that and this place (Masulipatam), in Rice, Sugar, Butter, and divers other sorts of provisions and coars Commodities. Secondly, it affords store of white cloths at Cheape Prices, such as is suitable for England, Persia, and the

Southwards...........Besides it yealdes good Store of of exceeding good powder Sugar, which Costs not there above two pence halfe penny the English pound, with all charges aboard. As much of this Commodity as may be got timely enough for Persia, we intend for that place by the *Discovery*. Gumlacke vppon stickes is there to be had very Cheape, and is much required, as well for Macassar and Persia as for England——Silke may there be Bought likewise yearely to a great Summe at 4 *in* 5 *fanams* the English pound.........Divers other things it affords for Persia, as *Shashes,* Stuffes, Allyjahs, fine Chite Cloths, and the like. Some whereof is now in Action for that place, and our Better experience will doubtless Bring the rest Also within the compass of our future investments.'' It was in Orissa that the first settlement was built. In 1651 it was decided to push higher up the Ganges and a factory at Hooghly was established which became the headquarters of the English Settlement in the Bay. Hooghly came into prominence as the principal port of Bengal when the Sarswati, which flowed by Satgaon, the great commercial capital of Bengal in the 15th and 16th centuries and the place where the first European factory was set up by the Portuguese, began to dry up. The sea-borne trade of Satgaon attracted the attention of the travellers of the day, particularly of Cesare Dei Federici who visited the place early in the 16th century and spoke of ''its rice, cloth of bombost of diverse sorts, lacca, great abundance of sugar, myrabolans dried and preserved, long pepper, oil of Zerzeline and many other sorts of merchandise.'' Another important commercial centre of Bengal during this period was the ''city of Gour'' which was surrounded by a network of rivers

and which on account of its position and commercial activity gave a great impetus to the ship-building trade. In the accounts left by several European travellers and in certain recently discovered Bengali manuscripts there are ample references to the vastness of its sea-borne trade. Before Satgaon attained importance Tribeni was the principal port of Bengal and both Pliny and Ptolemy mention it as an important sea port. Situated at the confluence of the Ganges, the Sarswati and the Jamuna, the place is still resorted to every year by hundreds of pilgrims, but the piety of these people finds nothing there reminiscent of the past secular glory of the place. But neither Tribeni nor Satgaon attained that pre-eminence as the sea port and emporium of Bengal which Tamralipti (modern Tamluk), enjoyed for centuries before they came to be known to history. Vivid descriptions of the prosperity of this port are contained in the writings of the Chinese travellers—Fah Hian and Huian Tsiang who visited India in the 5th and 7th century respectively. Indigo, mulbery and silk formed the chief exports from Tamralipti and from the traders and merchants of the place the ancient people "bordering the Mediterranean Sea" received those muslin fabrics "of the most delicate texture and extreme beauty" so much in request among them, which went by the name of "Gangetika" —a term suggesting their origin on or near the banks of the Ganges.

Growth of the English trade.

In spite of the exactions by the local officials of the Moghul Government and the vexations to which the English were subjected, they found their Bengal connections to be profitable and as the demands for Bengal

goods began to grow the Company enlarged their operations and established factories in various parts of Bengal. In 1665 the stock furnished for Bengal was valued at £65,000. Between 1665 and 1680 the value rose to £2,30,000. In 1675 the Company's exports from Bengal were valued at £4,30,000 and the imports at £8,60,000 besides private trade. It is further noticeable that in 1678 the cargo of bullion and goods which arrived at Hooghly per ship *Falcon* was valued at more than £40,000. The principal articles of the English trade in Bengal since their establishment at Hooghly were "rice, oil, butter, hemp, cordage, sail cloth, raw silk, silk fabrics, salt-petre, opium, turmeric, neelaes (indigo-dyed cloths), singhams, sugar, long pepper, beeswax, cassumber, white cummin seeds, bamboo, dry ginger, mustard, cotton, muslins, taffaties, ivory, spices (from the Eastern Archipelego)."

Dadani System.

The supplies of articles required by the Company for export were obtained on the *dadani* system of contract. Advances were made to craftsmen, weavers and the like by the Company and these craftsmen were required to hand over their goods at stated prices. This system went on up to 1752, but as difficulties were experienced in obtaining goods from those to whom advances had been made it was abolished in 1753 and the Company began to appoint *gomastas* to provide trading commodities from the various markets in Bengal.

Inauguration of pilot service.

The growth of trade led to the establishment of the pilot service in Bengal in 1667 and 1668. In 1667 a small vessel called the *Diligence* was built and fitted out to take soundings, note shoals and channels

and make a chart of them. To secure a supply of youngmen for the work, orders were passed next year by the Directors for the entertainment of several apprentices for a period of seven years.

Growth of Calcutta and its trade.

The first English Settlement at Sutanati was so modest that it is difficult to believe that the Calcutta of the present day has sprung out of it. It consisted of some mud and straw hovels with a few masonry buildings and its chief defence lay in the flotilla of boats lying in the river. The English who had come there as squatters were anxious to acquire a definite status and to find a pretext for building a fort. The rebellion of a Hindu landlord in the district of Burdwan, who allied himself with an Afghan Chief of Orissa in 1696, and the failure of the Mahommedan rulers to check the depredations which they carried out in surrounding areas gave the English the very opportunity which they had been seeking. They asked the Nawab for permission to fortify their settlement and on being told they might defend themselves they set to work to build a fort on the site between Fairlie Place to the north and Kailaghata Street to the south just below which to the west the river then flowed by. The first bastion and the walls were pushed on hurriedly and in 1710 the fort, named "Fort William" after the reigning king of England, was complete. That year also witnessed the construction of a wharf below the Fort as it was thought that "it would be a great security to the bank and strengthening thereto." Two years after the rebellion of the Burdwan Chief the English obtained the lease of collecting the revenues of the three towns of Kalikata, Govindapur and Sutanati and the first

Collector of Calcutta was appointed in the person of Ralph Sheldon to collect the revenues and to "keep them in order". This is the origin of the Calcutta Collectorate of the present day.

With the building of the Fort and the acquisition by the settlers of a definite status in the three villages the growth of Calcutta became rapid and the entire trade of Bengal began to be gradually focussed there. The trade, in spite of the check it received between 1711-12 on account of hostilities with the French fleet, began to grow until in the year 1727 the shipping of the port amounted to 10,000 tons. Public buildings and public institutions also began to come into existence and in 1707 a hospital was built for the Company's servants, towards the construction of which the Company contributed Rs. 2,000/-. In 1709 was built the Church of Saint Anne which on its demolition by Sirajudaullah was replaced by Saint John's Cathedral.

In 1727 a Corporation consisting of a Mayor with 9 Aldermen and a Mayor's Court were established.

The invasion by the Maharattas, the arrangements made by the English to defend themselves and the construction of the Maharatta Ditch in 1742 enhanced the prestige of the English in the eyes of the people, many of whom migrated to the town in order to remain under the protection of the English Fort.

The sack of Calcutta by Nawab Sirajudaullah in 1756, the re-conquest of the settlement by Clive and Watson in 1757 and the march of events culminating in the battle of Plassey and the installation of Meer Jaffer by the English as Nawab in place of Sirajudaullah consolidated and strengthened the position of the

English in Bengal. With a part of the restitution money granted by Meer Jaffer for the sack of Calcutta by Sirajudaullah, the fort was re-built on the present site. The English obtained from the grateful Nawab the zamindari of the 24-Pargannas and a free gift of the town of Calcutta and some adjacent *mauzas*, and from that time onward, in spite of occasional vicissitudes, caused by the great famine of 1769-70, the war with Meer Kasim and similar events, the English trade in Calcutta steadily increased. In fact the history of the Company's trade in Calcutta is a record of steady growth as the position of the English advanced step by step from that of mere traders, dependent absolutely on the good will of the Moghul Government and their servants and anxious to propitiate them by means of bribes and presents, to that of the real rulers of the Province and ultimately the paramount power in India.

Changes in the character of the trade.

The character of the trade has, however, undergone many changes and vicissitudes and possibly the history of the trade of Calcutta is no less interesting and romantic than the history of the rise of the British power in India.

Ship building.

At one time Calcutta was a very busy centre of ship-building and the industry received some encouragement from the famine which overtook the Carnatic on account of Hyder Ali's invasion of 1780 which necessitated the transport of grain from Bengal to the English settlements on the Coromandel Coast. From 1781 to 1821 more than 237 ships were built in the Kidderpore docks at a cost of more than 2 millions sterling "to the great displeasure of the ship-builders of Liverpool". The

decline of this ship-building in Bengal began after 1840 and the industry finally disappeared in April, 1863.

Cotton.

The principal articles of export from Bengal in the 16th and 17th centuries were cotton fabrics, muslin and silk. It is interesting to note that although there was a great demand for Bengal silk the Court of Directors found fault with the manner in which it was prepared. They objected to the vicious practice of dyeing it "in the gum" and as early as 1663 asked that the taffetas should be brought in an ungummed state, as they could receive this improvement in England in a superior manner, a successful experiment having been tried which made the Bengal silk pass in the market as Italian. Later on finding that the taffetas were still defective in colour they had to send out a large number of skilled artizans who were to endeavour to improve the silk manufacture but "to keep their arts secret from the natives". Notwithstanding the defects in the preparation of silk the sale of Bengal silk and muslin was very very brisk in England and the wearing of muslin became common in England replacing cambrics and linen from Flanders and Germany. About this time according to Milburne "the manufactured commodities of India imported into Europe and more particularly to England became so considerable as to occasion loud complaints against the East India Company as lesseners of the consumption of the English manufactures. The result was that a series of legislation were passed which restricted the sale of these commodities in England". These laws, though they somewhat checked the growth of export of cotton, yet could not entirely kill the trade. It continued to flourish till the end of the 18th century

when the export trade disappeared under the stress of competition with cheaper machine-made textiles in England and gradually an import trade supervened. Thus Bengal by the beginning of the 19th century instead of being in the position of supplier of cotton goods to Europe came to be dependent on Europe for her own supply.

As the export of cotton began to decline, the export trade in indigo developed. When the Europeans first came to India they obtained their supply of indigo from Western and Southern India. As the trade in Indian indigo threatened the woad growers and the merchants of Germany, France and England with ruin these countries had to pass edicts rendering the import of indigo into Europe a punishable offence. Indian production of indigo also received a severe check when the European colonists in America took to growing and manufacturing the dye and assisted in driving out the Indian indigo from the European market. The discovery by American Colonists that sugar and coffee were likely to pay better led to the revival of the Indian production of indigo. The East India Company, however, chose Bengal as the best place for obtaining supplies of indigo for export instead of Western and Southern India, from where they used to get supplies before, and gradually an independent and self-supporting European planting industry grew up. The treatment by European planters of the cultivators led to agrarian troubles and to the enactment of legislation for the protection of the latter and the industry then migrated to Bihar and North-Western India where it flourished till the discovery of synthetic indigo.

Indigo.

Tea and jute came in as indigo began to decline. The first to come was tea. The discovery of the tea-plant growing wild in Assam is generally attributed to two brothers named Bruce who brought back specimens of the plant in 1826 after the conquest of the Province from the Burmese. In January 1834 Lord William Bentinck appointed a Committee "for the purpose of submitting a plan for the introduction of tea culture in Bengal." The Committee began by sending out expeditions to China to procure tea seed and to obtain Chinamen to teach the Indians the method of cultivation, utterly oblivious of the fact that an indigenous stock had been discovered earlier. Attention was directed to the latter by a fresh discovery of the wild plant in Assam by Captains Charleton and Jenkins. The tea-planting industry was greatly assisted by the promulgation of the Waste Land Rules of 1854 and by 1877-78 the total number of tea gardens in Bengal was 221. In 1882-83 the total number of gardens increased to 300.

Tea.

In 1801 the East India Company were anxious to discover a good substitute for hemp and their attention was directed to jute which was extensively used by the Bengal weavers in the manufacture of gunny bags, cordage, cloth for bedding, screen garments of the poorer classes and many other domestic purposes. Spinning and weaving was at one time an important cottage industry in the populous Eastern districts of Lower Bengal and provided occupation to all classes of people, particularly Hindu widows who passed their leisure hours distaff in hand spinning gunny towels. In the early forties gunny came to be exported to North

Jute.

America and the Bombay coast for cotton packing, but more extensively as bags for exporting sugar and other produce to all parts of the world. In 1850-51 about 10,00,000 mds. of gunny cloth and bags valued at about Rs. 21,60, 000/- were exported from Calcutta. By this time jute had attracted the attention of Dundee spinners but their first experiments made on their flax and hemp machines in 1820 were so unfavourable that they had to guarantee their products as "free from Indian jute." In 1832, however, a fresh experiment was made by Dundee manufacturers with more success and they began successfully to compete for the supply of cotton packing cloth to Bombay. With the establishment of jute mills at Dundee a large export traffic in the raw material from Calcutta sprang into existence. The Crimean War which cut off the supply of flax and hemp from Russia first directed the attention of the Europeans in Calcutta to the establishment of mills in Bengal. It is interesting to note that, although the jute mill industry is now practically a monopoly of Scotchmen, the industry in Bengal owes its inception to an Englishman, George Acland, who was a midshipman in the East India Marrine Service. The first jute mill in Bengal was started at Rishra in 1855 on the site of the present Wellington mills at Serampore and here in 1854 the first machine-spun jute yarns were made. The rapid growth of this industry is so well-known that it need not be recapitulated here.

Associations for the development of trade.

For the protection of trade in Calcutta the Bengal Chamber of Commerce was established in 1834. The development of trade has been materially assisted by this Association as also by other Associations

such as the Royal Exchange, the Bengal Bonded Warehouse Association, the Calcutta Trades Association, the Marwari Chamber of Commerce and the Bengal National Chamber of Commerce.

In 1870 a Port Trust was formed to take over the management of the Port of Calcutta from Government. The Strand Bank lands were in due course made over to them on a yearly quit rent of Rs. 37,392/-. But we reserve a special appendix for the history of the development of the Port.

In recent years there has been a very gratifying activity towards the development of Indian industries to which the Swadeshi movement, first inaugurated as a protest against the dismemberment of Bengal, contributed not a little. This movement led to the establishment of several new manufactories more especially in the suburbs of Calcutta. For instance, in the 24 Pargannas saw mills and rope works have been started by Indian enterprise, while the manufacture of umbrellas, tin boxes and steel trunks has been taken up, and the Calcutta Pottery Works have established a reputation no longer confined to India. Another enterprise conceived in a genuine Swadeshi spirit is the Bengal Chemical and Pharmaceutical works which Mr. (now Sir John) Comming describes as "one of the most go-ahead young enterprises in Bengal." The Kerosene-oil tin manufacture is also a result of Swadeshi movement in this district. 20 years ago not a single tin was made in Bengal but now there are at least 5 factories with modern stamping machines which manufacture these tins in the neighbourhood of Calcutta. Mr. G. E. Lambourn, I.C.S., says that in the Maldah district the Swadeshi

movement gave renewed impetus to the manufacture of silk fabrics. Mr. L. S. O'Malley, I.C.S., testifies to the fact that in the Hooghly district "there has been a revival of indigenous industries owing to the stimulus given by the Swadeshi movement to the use of country-made goods."

Trade and the War.

The favourable position occupied by India during the war in her practical immunity from danger, the establishment of the Munitions Board to take advantage of her vast natural resources for the manufacture of articles likely to be required in the conduct of the war and the pre-occupation in other directions of countries which normally export to her led to a tremendous increase in her production and in the total volume of trade; and Calcutta had its full share in the increase. During the 8 months ending November 1916 as compared with the corresponding period of 1915 the value of imports increased by over 12½ crores to 101.6 crores, and the total exports including re-exports and the value of wheat and tanned cow hides exported on Government account, advanced by over 31 crores to nearly 157 crores. In one year the exports of Indian merchandise showed an increase of 25 crores or 23 per cent. In that year the grand total of imports and exports and re-exports amounted to 259 crores. And large increases in the import of bullion and treasure accompanied this increase in the traffic in merchandise.

Aftermath of the War.

The political upheavals in most of the European countries consequent upon the war, the difficulties which have arisen out of the reparations situation, the problem of unemployment with which Europe is now faced, the

abnormal fluctuations of some of the European currencies have combined to produce a world-wide depression. In India the situation has been aggravated by the collapse of new concerns started in response to an artificial demand, arising out of war conditions, for articles which India cannot produce at competitive rates in more normal times, the rise in the value of the rupee due to the increase of exports from India during the war and the trade boom of 1919-20 coupled with the sudden fall in the value of the rupee owing, amongst other reasons, to the relapse to a less favourable balance of trade. Calcutta is thus passing through a severe trade depression. Happily there are signs that these troubles will shortly be over and that trade will assume its normal conditions. Let us in all humility hope that the Calcutta Exhibition will do its part in contributing to this end.

FOREIGN TRADE OF THE PORT OF CALCUTTA.

(EXPORT.)

During the years 1881-1901.

Year.		Merchandise.	Treasure.	Total.
		Rs.	Rs.	Rs.
1881-82	...	33,31,05,288	21,55,826	33,52,61,114
1882-83	...	33,11,87,019	28,76,734	33,40,63,753
1883-84	...	34,96,61,289	11,11,473	35,07,72,762
1884-85	...	31,85,38,160	30,11,442	32,15,49,602
1885-86	...	32,04,68,184	9,94,555	32,14,62,739
1886-87	...	34,50,04,132	13,59,380	34,63,63,512
1887-88	...	35,71,26,557	8,78,118	35,80,04,675
1888-89	...	36,63,69,891	5,29,000	36,68,98,891
1889-90	...	38,05,45,094	13,33,542	38,18,78,636
1890-91	...	35,76,76,546	16,89,620	35,93,66,166
1891-92	...	38,63,58,520	27,78,038	38,91,36,558
1892-93	...	40,47,10,002	57,06,428	41,04,16,430
1893-94	...	40,97,89,931	29,27,088	41,27,17,019
894-95	...	44,95,78,465	84,80,649	45,80,59,114
1895-96	...	45,49,10,292	20,28,130	45,69,38,422
1896-97	...	44,63,43,880	32,78,127	44,96,22,007
897-98	...	44,13,96,587	1,18,30,971	45,32,27,558
1898-99	...	44,98,66,582	75,14,505	45,73,81,087
1899-1900	...	49,57,83,812	39,67,384	49,97,51,196
1900-1901	...	54,22,40,082	62,72,486	54,85,12,568

FOREIGN TRADE OF THE PORT OF CALCUTTA.
(IMPORT).

During the years 1881-1901.

Year.		Merchandise. Rs.	Treasure. Rs.	Total. Rs.
881-82	...	20,41,26,872	1,92,21,391	22,33,48,263
882-83	...	21,09,54,981	2,29,62,883	23,39,17,864
883-84	...	22,36,93,937	2,03,55,058	24,40,48,995
884-85	...	21,37,00,551	2,70,72,820	24,07,73,371
885-86	...	19,95,73,313	2,63,77,784	22,59,51,097
886-87	...	23,27,16,769	1,07,42,452	24,34,59,221
1887-88	...	23,24,31,963	1,28,37,167	24,52,69,130
888-89	...	25,65,12,732	1,41,66,279	27,06,79,011
889-90	...	25,05,78,694	1,18,32,324	26,24,11,018
1890-91	...	25,98,29,180	3,91,84,486	29,90,13,666
1891-92	...	25,29,72,493	3,35,99,849	28,65,72,342
1892-93	...	26,16,91,190	2,26,10,216	25,43,01,406
1893-94	...	28,94,81,525	1,83,63,817	30,78,45,342
1894-95	...	26,36,14,200	1,08,29,075	27,44,43,275
1895-96	...	26,82,56,317	1,35,90,673	28,18,46,990
1896-97	...	30,12,63,691	1,77,75,882	31,90,39,573
1897-98	...	27,85,49,496	3,26,10,705	31,11,60,201
1898-99	...	27,84,44,381	3,62,20,891	31,46,65,272
1899-1900	...	29,66,12,760	5,60,56,464	35,26,69,224
1900-1901	...	31,79,44,595	5,74,92,830	37,54,37,425

FOREIGN TRADE OF THE PORT OF CALCUTTA.
(EXPORT.)

During the years 1902-1922.

Year.		Merchandise.	Treasure.	Total.
		Rs.	Rs.	Rs.
1902-1903	...	52,03,70,834	83,61,980	52,87,32,814
1903-1904	...	57,25,22,362	40,01,690	57,65,24,052
1904-1905	...	61,32,49,610	17,70,682	61,50,20,292
1905-1906	...	67,41,94,531	30,32,162	67,72,26,693
1906-1907	...	78,47,97,419	64,63,683	79,12,61,102
1907-1908	...	69,92,85,717	42,30,542	70,35,16,259
1908-1909	...	66,24,27,310	49,58,417	66,73,85,727
1909-1910	...	69,88,70,014	16,90,108	70,05,60,222
1910-1911	...	77,84,78,637	45,13,726	78,29,92,363
1911-1912	...	85,87,17,226	10,10,236	85,97,27,462
1912-1913	...	94,60,83,152	14,38,853	94,75,22,005
1913-1914	...	97,90,23,040	60,04,872	98,50,27,912
1914-1915	...	71,13,00,860	43,93,370	71,56,94,230
1915-1916	...	87,89,63,755	24,71,861	88,14,35,616
1916-1917	...	92,67,00,233	3,93,818	92,70,94,051
1917-1918	...	82,69,31,212	61,361	82,69,92,573
1918-1919	...	1,02,37,85,025	14,808	1,02,37,99,833
1919-1920	...	1,34,18,88,079	2,978	1,34,18,91,057
1920-1921	...	1,08,28,54,141	3,32,27,349	1,11,60,81,490
1921-1922	...	86,99,27,750	44,01,071	87,43,28,821

FOREIGN TRADE OF THE PORT OF CALCUTTA.
(IMPORT).

During the years 1902-1922.

Year.		Merchandise Rs.	Treasure. Rs.	Total. Rs.
1902-1903	.	32,65,99,348	5,72,93,829	38,38,93,177
1903-1904	..	33,49,25,364	9,47,69,291	42,96,94,655
1904-1905	...	38,35,25,518	10,44,43,477	48,79,68,995
1905-1906	..	41,60,05,598	6,05,48,436	47,65,54,034
1906-1907	..	42,00,59,544	8,54,61,889	50,55,21,433
1907-1908	...	52,62,88,755	7,46,69,441	60,09,58,196
1908-1909	..	44,23,72,258	3,57,38,213	47,81,10,471
1909-1910	..	46,62,15,500	5,44,57,987	52,06,73,487
1910-1911	...	48,54,07,250	5,02,22,437	53,56,29,687
1911-1912	..	51,97,77,250	8,40,98,697	60,38,75,947
1912-1913	.	61,35,16,335	3,65,04,968	65,00,21,303
1913-1914	.	70,68,80,459	3,80,72,057	74,49,52,516
1914-1915	.	56,20,98,165	2,81,54,907	59,02,53,072
1915-1916	...	52,32,58,369	3,00,45,727	55,33,04,096
1916-1917	..	56,08,33,912	1,68,39,426	57,76,73,338
1917-1918	...	57,98,51,504	9,81,51,116	67,80,02,620
1918-1919	...	63,62,22,759	2,06,397	63,64,29,156
1919-1920	...	83,24,72,416	3,81,91,347	87,06,63,763
1920-1921	...	1,18,70,01,264	1,21,96,178	1,19,91,97,442
1921-1922	...	1,01,54,75,744	69,16,999	1,02,23,92,743

APPENDIX B.

MARITIME TRADE AND THE PORT OF CALCUTTA.

Historical.

The suggestion is often heard that the present location of the Port of Calcutta was decided fortuitously and that the major port of Bengal would have been better placed nearer to the sea, say, at Diamond Harbour. It is more than doubtful, however, whether these ideas are well-founded. It is probably true that the exact site of the present port is in a sense fortuitous, but this is no more true of the port than it is of the city as a whole. Indeed, there are indications that the selection of a suitable anchorage for ships had no little influence on the site of the small trading station, which has become modern Calcutta. The first chart of the river Hooghly of which we have definite knowledge is that drawn up by Mr. Thomas Bowrey and reproduced in his book entitled "The Countries round the Bay of Bengal, 1669-1679". This chart is dated 1687 and shows three villages on the left bank of the Hooghly under the names Suttanutti, Gonerdepoer, and Kedarpoer, the last mentioned being situated just upstream from what is called the "Long Reach". It is surely more than chance that the "Long Reach", now known as "Garden Reach", is at present the turning round and temporary anchorage for ships entering and leaving the modern port of Calcutta, and that just above this Reach, there is deep water along the left bank of the Hooghly for a distance sufficient to

give safe anchorage for many vessels. And when it is further remembered that even as high up the Hooghly as the site of Calcutta, there were devastating cyclones in 1842 and 1864, which almost completely wiped out the population of the areas between Calcutta and the sea, it may safely be inferred that our ancestors were on the whole well-advised in their choice of site. It is true that up to recent years a further argument would have been advanced against this view, namely, the presence of two formidable bars, Moyapore and the Eastern Gut, the latter of which is more popularly known as the "James and Mary". One or other of these bars, more often the latter, generally formed the weakest link in the chain between Calcutta and the sea; in other words, constituted the "governing" bar which limited the draft of vessels. But since the Port Commissioners in 1907 initiated systematic dredging by modern sand-suction dredgers it has been found possible to control these two bars to such an extent that it is now extremely unusual for them to be less favourable than those lower down the river. In other words, so far as the draft of ships is concerned, it is usually possible for any vessel which can ascend the river to Diamond Harbour also to come to Calcutta itself.

Early Projects.

Before we proceed to outline the actual development of the modern port, it will be of interest to examine some of the schemes which were suggested from time to time but eventually abandoned. The construction of wet docks as the means of improving the port of Calcutta was put forward even before the end of the eighteenth century, when General Watson, who had founded a marine yard at Kidderpore, obtained the grant of land

both from the King and also from the East India Company for docking purposes. He designed, and actually commenced in 1781, the construction of wet docks between Tolly's Nullah and Kidderpore and in order to carry out his design, even went to the length of diverting the Nullah from its old course. The scheme was, however, eventually abandoned after General Watson had expended upon it and upon work connected with a dry dock and ship-building yard at the site of the old Royal Indian Marine Dockyard, recently acquired by the Port Commissioners, some Rs. 10 lakhs of his own fortune. In 1824 Major Schalch produced a plan differing in design but with the same general object of constructing wet docks in Tolly's Nullah. This scheme was referred to a Committee, who also reviewed a scheme put forward by Mr. Colvin for a Dock to be situated between Meerbohur Ghat and Neemtollah, but both schemes were dropped owing to the outbreak of the Burmese war. In 1831 a survey was made by the Government of India with a view to the excavation of a canal from Calcutta to the head of the Mutlah River. This proposal for a canal, though revived at various times, was postponed in consequence of the construction by the Calcutta and South-Eastern Railway of the line to Canning town and later was abandoned in consequence of the deterioration of the Mutlah River. Some years later, the hurricane of June, 1842 caused heavy loss of life and property and led to the appointment of a Committee to consider means of guarding against the recurrence of such a calamity. This Committee reported to Government in May, 1846, recommending the construction of the wet docks at Kidderpore. Their scheme contemplated the construction, at a cost of about

Rs. 50 lakhs, of a dock to accommodate 200 vessels per annum, and it is of interest to note that the average burden of the vessels to be accommodated was taken at 400 tons only. The scheme, however, was dropped through lack of financial support, as Government were unwilling to take the whole responsibility and adequate funds were not forthcoming from private sources. In 1847 endeavour was made to float a Company with a capital of £1,000,000 for the construction of a line of railway from Diamond Harbour, where warehouses and wet docks were to be built, but this scheme also fell through for financial reasons. Some 10 years later schemes were put forward for docks on the right or Howrah bank of the river and others for the utilisation of the Mutlah River, but neither materialized and it was only after 1860 that out of the various proposals put forward, there gradually emerged the decision to construct screw-pile jetties on the Calcutta bank as the readiest means of supplying the needs of the port. At the same time it was decided that these should be undertaken by a public body rather than by any private interest.

First beginnings.

Thus the period from 1860 to 1870 is of great importance in the history of the Port of Calcutta, both because the constitution of the Trust itself was definitely determined within these years and also because, as the result of the formation of the Trust in its present form, the same decade saw the beginning of the development of the Port on considered and systematised lines.

The Trust did not reach its present form without

some delay and difficulty. The local Government of that day decided, in the face both of commercial opinion and the expressed views of the Government of India, that the Municipality of Calcutta should also form the body charged with the development of the port, but the impracticability of this arrangement was soon evident and eventually in 1870 a bill was passed under which the present Commission was initiated. Subject to changes in the number of trustees, which has increased from 9 to 14, and in a number of other respects, the Port Trust has had a continuous existence from 1870 up to the present, and the story of the development of the port is therefore also the record of the work of successive generations of its trustees.

Constitution of Port Trust.

Some little work, chiefly the construction of several T-headed jetties, had been done prior to the passing of the Act of 1870 to meet the urgent demands of trade, and when the Port Trust commenced its operations in 1870-71, it took over from Government some four screw-pile jetties, fitted with steam cranes and sheds, together with certain other works as the nucleus of the facilities of the port.

Jetties—growth of import trade.

During the six months from October, 1870, to March, 1871, 52 vessels with a total tonnage of 47,774 tons were accommodated at the four completed jetties; the amount received from them aggregated Rs. 1,03,763 and the average number of days each ship occupied her berth was 11.3. This was for discharge only, the Commissioners not being then in a position to undertake loading. The agents of one ship, the "Bowfell", contended that the Commissioners were not empowered to

place a ship at their jetties unless they were prepared to load as well as discharge her, and, their contention being supported by the Advocate-General, an Amending Act was found necessary.

During the first complete year of working, 1871-72, when the jetties—then six in number—accommodated 143 vessels with a nett tonnage of 222,446 tons and receipts of Rs. 3,63,145, it was found necessary to double the size of the sheds, to build sheds for two additional jetties, to extend the jetty heads (which had originally been short T-headed structures) and finally to connect the extended jetties into one continuous wharf at a cost of Rs. 5½ lakhs.

The traffic handled grew steadily and rapidly. The report for the year 1879-80 shows that eight jetty berths had been completed, at three of which cargo could be delivered direct from vessel to shed, and hydraulic cranes were in process of substitution for the old steam-cranes. The number of vessels had risen to 192 with a nett tonnage of 315,263 tons and receipts of Rs. 6,56,409.

In 1889-90, at the end of another ten years, there were still eight jetties in use; the number of vessels accommodated showed a slight further increase to 203, the nett tonnage to 419,026 tons and the receipts to Rs. 9,04,905, but during the last seven years of this decade the number of ships and their tonnage was more or less stationary.

In the year 1897-98 it had been found necessary to re-arrange the moorings and jetty berths in order to cope with the rapidly increasing size of steamers, with the result that the number of berths had been reduced from eight to six. Thus at the end of the third decade,

in 1899-1900, with six berths available, the number of vessels berthed at the jetties remained at practically the same figure, *viz.*, 204, but their tonnage had increased to 538, 848 nett tons and the earnings to Rs. 11,87,650.

During the fourth decade, from 1900-10, No. 2 jetty and shed were entirely re-built on modern lines, the new shed being a large double-storied structure with an ample covered roadway on its east-side, and in the same year the construction of two additional jetties of a modern type towards the south was decided upon. The first of these, No. 7, was completed in July, 1907, and the second, No. 8, in November, 1908. On the other hand, the gradual movement of the deep channel to a point somewhat lower on the Calcutta side, combined with the increasing depth of steamers, had made the continued use of No. 1 jetty for the berthing of ocean-going steamers impracticable, and it was given up for the use of the coasting trade, these steamers continuing to be berthed in the stream and the goods removed to and from No. 1 jetty in boats. In the financial year 1913-14 a total of 254 vessels were accommodated at the jetties, having a nett tonnage of 1,186,797 tons, and the total receipts were Rs. 2,451,126.

Effect of war.

The outbreak of war in August, 1914, necessarily caused a serious set-back in the trade of the port and more particularly in the import trade, which is so largely handled at the Calcutta jetties. The tonnage handled fell rapidly and during the last year of the war 1918-19 amounted only to 574,000 tons. Since the war there has been some improvement, more particularly in 1920, but the trade had not yet altogether recovered its pre-war dimensions.

Reference has been made above to the question of the use of the Calcutta jetties for the loading, as well as for the discharge of vessels, which was raised at an early date in the history of the Trust. But for a number of reasons the use of the Jetties was, and still is, confined almost entirely to the discharge of import cargo and for many years after they were in full use, it was the practice for vessels loading exports to do so in the stream; the goods exported being boated from different points within the Port, but largely from the Howrah Station, to the vessel as she lay at her moorings. As the export trade developed, the delay and inconvenience, which was necessarily caused by this method of loading, was more and more realised, and from the year 1881 onwards, different projects came under discussion for the improvement of the facilities for export traffic. In 1881 there was sanctioned, the construction of the branch line to Diamond Harbour and in according his approval the Secretary of State for India ordered the formation of a Committee to consider the construction of wet docks at that place, the suggestion being that these would be worked in connection with the new line of railway. This Committee reported in May 1882, when the official members expressed themselves in favour of the construction of wet docks at Diamond Harbour, while two representatives of the Commercial Community differed from this view, one advocating further investigation of the possibility of additional accommodation being provided in Calcutta or just below, and the other questioning the wisdom of spending further sums on docks which would be accessible from the sea only by the Hooghly, in view of the proposed ship canal to the Mutlah River,

Export trade.

which had been proposed by Mr. Duff-Bruce, then the Vice-Chairman of the Port Commissioners. This latter view indicates the importance then attached to the various proposals for the utilisation of the River Mutlah, then regarded by some as generally superior to the River Hooghly, either by the construction there of an auxiliary port or by a canal thence to Calcutta. To understand this view it should be remembered that the condition of the Hooghly had caused serious anxiety from time to time and that more than one expert had reported in pessimistic language, while the Port Canning scheme had already taken shape; the line of railway from Calcutta to Port Canning had been completed in 1863 and some years later the construction of a number of jetties and sheds had been finished. In 1883-84 a detailed survey of the river Mutlah was carried out with fairly satisfactory results, the report stating that "with certain facilities and ordinary care in navigation it should be possible for vessels to be taken in and out without the necessity for a Pilot".

Kidderpore Docks.

Nevertheless when the whole position was further reviewed in 1883 and the earlier projects for Docks in the neighbourhood of Calcutta were again considered, the Joint-Committee came to conclusions markedly different from those mentioned above. The Committee commenced by a careful analysis of the commerce of Calcutta as they then found it. They pointed to the progressive increase in the tonnage visiting the port in both the import and export trades, the growth of downwards traffic on the East Indian Railway—nearly one-half of which comprised goods exported by sea from Calcutta—a similar growth of traffic on the Eastern

Bengal Railway and on the canals and river. They paid special attention to trade practices connected with the chief export staples, showed that direct shipment was difficult if not impossible and that the chief advantage claimed for the Diamond Harbour scheme would therefore not be realised. The Commissioners' jetties were fully occupied in handling the general import trade and neither salt ships nor export vessels could obtain accommodation but had to lie in the stream and discharge or take their cargo by boat. As regards jetty accommodation, the Committee considered that, if any extensions were to be provided for the import trade, this should be limited to two jetties placed on the south of No. 8 jetty, but deprecated such expenditure unless the dock scheme were seriously delayed. As their main recommendation they proposed the construction of a wet dock at Kidderpore, with two entrances to be made through the Government Dockyard, together with an extension of railway accommodation and the provision of further wharves and warehouses. In arriving at this view they rejected the two proposals for docks at Akra, as they found that this site was peculiarly unsuitable for the docking of ships, the then Deputy Conservator, Lt. Petley, remarking that the site suggested was one of the last places he would have chosen in the whole length of the river. They found a general unanimity that any dock constructed should be on the Calcutta side and they regarded the completion of the Railway Bridge enabling the East Indian Railway to work into such a dock as likely to concentrate there both the import and export trade. They furnished full details of the scheme proposed by Mr. Duff-Bruce, estimating that with an expenditure of Rs. 231 lakhs on the dock

and on the extension of the tramway from the jetties, the Port Trust would have to meet an annual expenditure of Rs. 11.26 lakhs against receipts of Rs. 25.24 lakhs, thus leaving available for fixed charges a balance of Rs. 13.98 lakhs, sufficient to meet interest but not sinking fund charges on the cost of the dock. With a reasonable increase of trade there would be a considerable surplus. As regards the proposed ship canal to the Mutlah, they estimated its cost at Rs. 110 lakhs, and the total annual expenditure involved in providing this second entrance to the port at Rs. 8.88 lakhs, which they believed could be met without any great increase in the existing charges. They were of the opinion that the Commissioners could not raise so large a loan as Rs. 2 crores and thought Government should assist either by advancing the capital or guaranteeing the loan. The next stage in the history of the dock scheme is that of the criticism directed by a number of experts against Mr. Duff-Bruce's scheme. Altogether there appear to have been five Engineers of eminence who reported to Government regarding these proposals; these critics included Sir Alexander (then "Mr.") Rendal, whose name was so intimately associated with the growth and progress of the East Indian Raiway, and who expressed the view that "no dock had yet been completed which had involved so many and serious risks as these"; and it is to the lasting credit of Mr. Duff-Bruce, that in spite of the severe criticism which every item of his proposals had to encounter, the modifications eventually made were of a minor character and his scheme was carried out practically in its entirety. It was in 1884 that sanction was given to the commencement of work on the scheme, on the under-

standing that only the tidal basin and No. 1 Dock, totalling 46.13 acres out of the 110 acres which the whole project involved, should at first be constructed. Work was actually commenced in the financial year 1884-85 but was seriously hampered by financial difficulties and also in a lesser degree by engineering trouble in constructing the Boat Canal, from which comes the supply of water to the Docks. By 1889-90 the tidal basin had been completed and brought into use and No. 1 Dock was almost finished. In 1891-92 the small Graving Dock, built for the Royal Indian Marine but recently transferred to the Port Commissioners, was completed and in October of the same year the first of the Commissioners' Dry Docks. In 1892-93 No. 1 Dock was completed and the first vessel entered on the 21st June, 1892. The cost of this portion of the scheme amounted to Rs. 2.61 crores.

Though the Kidderpore Docks were constructed primarily to provide for the export trade the advantages which they offered were not at first fully realised. In 1893-94, the total amount of cargo landed within the Docks was about 29,000 tons and of that shipped about 81,000 tons. These figures may be compared with those of recent years, when in No. 1 Dock alone over 1½ million tons have been shipped within a period of 12 months.

But it was not long before the many advantages offered by the Kidderpore Docks were better appreciated and their fuller utilisation was accelerated by two important developments, namely, the export of wheat and seeds and of coal. In 1893-94, the export of wheat and seeds over the Dock quays amounted to 400 tons

only, but by the year 1898-99 it had grown to over 214,000 tons, as the inevitable congestion at Howrah, whence shipments were boated to vessels loading in the stream, had driven the trade to the Kidderpore Docks, where it was possible to bring railway wagons alongside grain warehouses and shipment sheds. At the same time, the export of coal had rapidly grown; the 4,000 tons or so shipped in 1893-94 had increased within 5 years to little less than one million tons, and since that date has more than trebled in favourable years. Concurrently with this increase in the tonnage of commodities handled, the accommodation provided at the Docks had been increased, until in 1913, which year was the climacteric or pre-war trade in Calcutta, there were, altogether in the Kidderpore Docks 18 general berths and 10 coal berths, of which two were fitted with equipment for the mechanical loading of coal. In close contiguity to the Kidderpore Dock system there had also been erected the Kantapukur sheds with an aggregate floor area of nearly one million square feet, while in "Hide Road" on the west there were a series of large godowns, specially constructed for the hide and skin trade, and on the river bank immediately south of the Dock entrances had been built the large riverside and "Sale" tea warehouses, handling the enormous quantities of tea which arrived for shipment both by river and rail.

In spite, however, of the additional facilities provided in connection with the Kidderpore Dock system it was found that further steps were required if the trade of the future were to be adequately provided for. Sir Frederick Dumayne, then Vice-Chairman, fully realised that the possibilities of the Kidderpore

Docks, with their one Lock Entrance,—through which had to pass not only all the ocean-going ships which went there to unload or load, but also the large numbers of lighters or cargo boats by which so much of the cargo was handled,—was approaching their limits, and that before long it would be necessary to face the construction of a new Dock system.

Further development.

Hence the Commissioners commenced in the year 1910 the acquisition of a large additional area to the south and west of the Kidderpore Dock system, so as to be provided with ample land, both for the new Dock itself, for the warehouses which its trade would involve and for the construction of a new and improved marshalling yard in which to handle the whole of the connected railway work. These acquisitions included the valuable river frontage at Garden Reach, commencing immediately to the south of the Bengal Nagpur Railway property which forms the Calcutta terminal of that line and stretching continuously downstream to a spot known as "Camberbatchie's Point". After prolonged consideration it was decided to utilise this area in two stages :—

Garden Reach Jetties.

(*a*) By the construction on the river front of five riverside jetty berths, one of which was to be a coal berth replacing a private coal berth belonging to the British India Steam Navigation Co. which had occupied a part of this frontage, and the remaining four to be general produce berths for import and export traffic, to be provided with modern two-storied transit sheds and full crane equipment.

(*b*) By the construction of a new Dock system,

having its entrance downstream and immediately below the last of the riverside jetty berths and running more or less at right angles to the river. The full development of this new Dock system would, it was estimated, provide for about 40 berths of large dimensions.

King George's Dock.

These decisions, which were arrived at by the Commissioners in 1913, were fully reviewed in the cold weather of 1913-14 by an influential Committee sitting under the Chairmanship of Sir William Duke, and specially appointed by Government to examine the facilities then existing and those required to improve the anticipated future development of the Port and Province. Though the abnormal conditions created by the war during its course and for the whole of the period which has expired since the Armistice have necessarily interfered very seriously with the expected development of trade, the conclusions of this Committee remain the accepted policy of the Commissioners, and it will be of interest to trace the course of actual development up to date in pursuance of the policy thus laid down.

At the time of writing, the last of these five riverside berths is approaching completion and by the date of the Exhibition it is hoped that all will be available for use. As regards the King George's Dock work, this great scheme was commenced in earnest in the official year 1920-21 and it is hoped that the first section, which will comprise the Entrance Lock 750 ft. long by 90 ft. wide, alongside it, two dry docks arranged in tandem and constituting an alternative entrance in emergencies, together with four additional berths and a heavy lift yard, may be completed during the official year 1927-28.

In addition to these schemes of development the Commissioners have added to their equipment since the war a large suction Dredger, the "Gunga", a sea-going tug, a Despatch vessel, a large additional floating crane, a new firefloat and a number of other craft, together with additional locomotives and wagons. It may be said that the equipment of the Port as a whole is now on a more complete scale than has ever previously been the case.

Post war additions to Fleet etc.

Mention may here be made of the Commissioners' Ferry Service for the transport of passengers and small packages both across and up and down the river. The institution of this service is largely attributable to the special efforts and interest of the then Vice-Chairman, Sir Frederick Dumayne. It commenced in October 1907 with seven screw steamers built by Messrs. Thornycroft & Co. and comprised 3 runs above and 3 below the Howrah Bridge, namely, from Sulkea to Burra Bazar, Ahiritolla and Bagh-Bazar and from Chandpal Ghat to Telkul Ghat, Ramkristopur and Sibpur. The results of the first six months' working showed that the service met a real want, as over 20,000 passengers were carried in the first class and more than 2,000,000 in the second class. In 1910 four more steamers were obtained and five more stations were opened, namely, Bally, Sibutolla, Kuti Ghat, Cossipore and Uttarpara. In 1912 two more steamers were obtained and three more stations, Matiabruz, Rajabagan and Rajganj were opened. In the following year a station was opened at Tuckta Ghat and a little later that at the Botanical Gardens made permanent. Two steamers were commandeered by Government during the war but have since been

Ferry Service

replaced by two paddle steamers and in addition two large paddle steamers which are used during the opening of the Howrah Bridge are also utilised in this service. Although not remunerative to the Commissioners, the service has continued to expand and now carries approximately 1,000,000 passengers per month or 12,000,000 per year.

PORT APPROACHES.

As the result of the deliberations of a Committee appointed in 1880, the Port Commissioners took over in that year the control of the Port Approaches, including the supervision of the River Survey Department, the light vessels and lighthouses, the houses of refuge in the Sunderbuns and the Wreck and Anchor Department, and at the same time the Port Commissioners were declared the Conservators of the Port Approaches and were authorised to receive the Port dues paid by vessels entering the Port. This arrangement involved the making over to the Port Commissioners of the three lighthouses at False Point, Saugor Island and Kaukhali, the seven light ships "Comet", "Mermaid", "Meteor", "Foam", "Canapus", "Planet" and "Star", the two River Survey vessels "Clyde" and "Cuckoo", the steam launch "Tryon", the buoy vessel "Dolphin", the anchor vessel "Vulcan", some smaller craft and all the river marks, semaphores, buoys and gauges then in existence, together with the staff employed at the lighthouses and on the vessels. During the 43 years which have since elapsed the Commissioners have modernized and extended the facilities provided for safe navigation in many ways.

Of the three lighthouses, that at Saugor Island dates back to 1821, but it existed at first only as a light exhibited from the top of a wooden tripod; the lighthouse was built in 1852 and then exhibited a light of 18,000 candlepower: in 1909 the old light was replaced by one of a modern type of 24,000 candle-power, and in 1911 the lighthouse itself was dismantled and re-erected on its present site, the erosion of the foreshore having rendered the original site unsafe. The lighthouse at False Point, near the mouth of the River Mahanadi, dates back to the year 1838, but the present light was first exhibited in 1880 and was converted into an occulting light in 1884. In consequence of the rearrangement of the boundaries of the Province of Bengal, the lighthouse, which is in Orissa, was transferred to the Behar and Orissa Government in 1915. The Kaukhali lighthouse is the earliest of all, the light having been first exhibited in 1810. It has been placed out of commission since December 1922 as owing to alterations in the channel, it is now of little use in navigation.

As regards lightships, in 1880 there were six "stations", which were known respectively as the Eastern Channel, first exhibited in 1816, Mutlah in 1857, Pilot's Ridge in 1861, Intermediate in 1877, Lower Gasper in 1827, and Upper Gasper in 1858. All these stations exhibited a fixed light of approximately 300 candle-power, and consequently it was impossible to distinguish one light from another at night, while the vessels themselves were painted grey, although it is essential that lightships should be distinguishable from the maximum possible distance and in latter years warships have been painted grey with the opposite inten-

tion. All these lightships were "attended", *i.e.*, provided with full crews responsible for the maintenance of the light, display of blue lights, sounding of fog horns, etc.

There are now eight "stations". Of the two additions the Long Sand Light, to mark the southern extremity of Saugor Roads, was first exhibited in 1883, but in 1905 was shifted to the head of the Middleton Bar and re-named the Middleton Light; while the Gabtola Light, to mark the head of the Gabtola Bar, was first exhibited in 1916. All lightships have been painted red since 1885. The five outer vessels have been re-fitted with powerful flashing lights of from 15,000 to 20,000 candlepower, the characteristics of each light being different from that of the others so that, with other improvements that have been introduced, the identification of the vessels is an easy matter. Two of the former attended vessels, at the Upper Gasper and Middleton stations, have been replaced by up-to-date "unattended" lightships, burning gas. One, the "Moore", which had a flashing apparatus of the Pintsch type and the other the "Planet", have been re-fitted this year with the latest type of acetylene gas flashing apparatus with a sun-valve attached to it.

The improvements in the river proper have kept pace with those in the approaches. In 1880 there were 4 semaphores and 54 river marks; there are now 7 semaphores and 285 river marks; anchoring lights have been instituted at all important anchorages, and the number of buoys defining the channels has risen from 107 to 126. The most marked improvement, in expediting the movements of shipping, has been the lighting of the channel from Mud Point to the sea, by

means of modern gas buoys, so that vessels can navigate this portion of the estuary by night. The value of this improvement is particularly great in the case of vessels outward-bound, as while inward-bound vessels, provided their speed is sufficient and their draught not excessive, will generally have sufficient rise of tide to negotiate all the bars from the sea to Calcutta on one flood tide, outward-bound vessels must meet a succession of tides and there are two bars in the Upper and three in the Lower Reaches which must be negotiated with a sufficient rise of tide. Vessels, therefore, leave Calcutta at such time that they can cross the Moyapur Bar, 18 miles below Calcutta, as early on the flood tide as their draught will permit, and thus negotiate the Eastern Gut Bar as soon after high water as possible. As the tide is then ebbing, it is dependent upon the vessels' draft and speed and the depth on the Balari Bar, 52 miles below Calcutta, whether they have sufficient water to cross it on the same tide. If they are able to do so, they then anchor in one of the Jellingham anchorages as the tide has fallen too low to permit them to cross the Gabtola Bar, but can get under weigh when the night flood tide serves and are out of the river within 24 hours. Before the channel was lighted, they could not proceed until the tide served on the following day. When the adoption of night navigation, from Mud Point to the sea, was first proposed, some objection was raised by the Pilot Service on the score that the facilities offered were not sufficient for safety, but finally the Commissioners' arrangements were accepted, on the understanding that they would station an attended light vessel in the Gabtola channel, which was done in 1916. The facilities originally provided were appreciably enhanced by the construction of

an automatic, electrically-illuminated night semaphore, which was invented by Mr. H. G. Reaks, the River Surveyor. This semaphore, by means of a combination of lights exhibited on high masts, displays the rise of tide at Phuldobi, for the guidance of vessels navigating the Gabtola Bar.

A river of the nature of the Hooghly necessarily requires a very complete system of surveying. This duty is carried out by the River Survey Department, which works in four main parties, one between the sea and Hospital Point, one between Hospital Point and Fulta Creek,—which limits include the James and Mary Reach,—one between Fulta Creek and Pir Serang, and one between Pir Serang and Cossipore. Surveyors are also posted to the three large suction dredgers, to make daily surveys of the localities in which the dredgers are operating. In addition, Indian Serangs are maintained at Hooghly Point and Moyapur. The expansion in the output of work of the River Survey Department, since the Commissioners assumed control of the port approaches, is evidenced by the fact that while in 1882-83 the number of Plans and River Notices issued for the information of Pilots was 58, in 1922-23 it was 1345.

Turning to the bars on the river, the Commissioners have endeavoured to effect improvement by the use of large suction dredgers. The "Sandpiper" was first commissioned in 1907 and the "Balari" in 1913; a third dredger was ordered in 1914, and was commandeered by the Admiralty for war purposes, but a larger vessel in replacement was built by Messrs. Simon & Co., Renfrew. This Dredger, the "Gunga" was commissioned in Calcutta in January 1922 and has a hopper

capacity of 4,000 tons which she can fill within the hour. The major bars in the Hooghly are the Moyapur and Eastern Gut in the Upper Reaches, and the Balari, Gabtola and Middleton in the Lower Reaches, the latter being of much greater extent than those in the Upper Reaches, but more stable. For these reasons, dredging operations have been almost entirely confined to the obstructions in the Upper Reaches where appreciable improvements have been effected. On the Eastern Gut, the mean depths—since dredging was first undertaken in 1907—are greater by 3 to 4 feet in the worst months than were available in the period 1875-1906, and 5 to 9 feet than in the middle of the century. On the Moyapur Bar, where the tendency to a bar formation is more continuous than on the Eastern Gut, the mean depths have been increased by 2 feet 10 inches over those of the period 1875—1906. In addition the bars in the Upper Reaches, the crossings between Calcutta and Moyapur often constitute an obstruction to deep vessels as, owing to the fact that vessels leave Calcutta on the last of the ebb tide so as to meet the flood tide at Moyapur, they must be negotiated at or near low water. These obstructions are at Panchpara, Pir Serang, and Sankral. As the available depth at the time that outward-bound vessels negotiate them is about 24 feet or more, it is obvious that they were of little consequence when the deepest vessels only drew this amount of water, but, in recent years, with the increased draught of vessels, they frequently require dredging during the deteriorative season to prevent detention to vessels.

In view of the alarming rumours, revived at intervals, regarding the Lower Reaches of the river, a statement of the real conditions may be of interest.

Mr. Reaks, in the valuable note prepared by him, which was attached as an appendix to the "Report on the Hooghly River and its Head Waters", says :—

"The channels in this section, as already stated, pass through great fluctuations but, comparing the general stability of the present channels, with a least depth throughout of, generally, 15 feet or more in the past 20 years, with the condition between 1848 and 1882, when, in only one year 1866, a depth of 15 feet was obtainable right through the estuary, it is obvious there can be no question of deterioration, even allowing for more accurate surveys at the present day. This is emphasised by a comparison of the present actual conditions of three stable bars; the Balari giving 16 feet 6 inches, the Gabtola 14 feet 6 inches and the Middleton 16 feet 6 inches depths, with the state in 1863, when the Rangafala, Auckland and Bedford channels were all in a very disturbed condition and provided best depths, respectively, of only 11 feet 3 inches, 13 feet 6 inches and 12 feet. In the worst condition in the past 20 years, which occurred in 1899, the Gabtola Bar gave 11 feet 6 inches at the same time as the Upper and Lower Balari Bars provided 14 feet 6 inches and 16 feet, respectively".

The clearest evidence of improvement is, perhaps, furnished by the following facts :—Prior to 1830 Pilots were prohibited from moving vessels drawing more than 17 feet at any time of the year between Calcutta and Diamond Harbour; in 1830 the limit was raised to 20 feet, vessels over this draught having to discharge part of their cargo either at Saugor or Diamond Harbour. In 1860 no vessel drawing more than 23 feet used the river; in 1870 none of over 24 feet and only 4 between

23 and 24 feet. In 1880 the maximum draught increased to 25 feet 2 inches, in 1890 to 26 feet 1 inch, in 1910 to 28 feet 3 inches, in 1911 to 29 feet 3 inches, and since then to 30 feet 4 inches. Taking tonnage as the criterion, in 1853, when the Hooghly Commission was considering the abandonment of the river, the largest vessel visiting the port was of 1,810 tons. By 1860 this figure had risen to 2,163 tons, by 1870 to 3,128 tons, by 1880 to 4,023 tons, by 1890 to 6,037 tons, by 1900 to 7,237 tons, by 1911 to 8,117 tons, and since then 12,989 tons. In length vessels have increased from 368 feet in 1871 to 540 feet at the present day.

It must, of course, be remembered that, in the earlier years of the period under review, a large percentage of the vessels trading to this port were sailing ships which had to be towed up and down the river, that steamers had less engine power, and vessels everywhere were smaller. It must not be assumed, therefore, that the Port Trust claims the whole credit for the marked advance in the size and draught of the vessels that can navigate the river with safety. It can be fairly claimed that by the great expansion in constant and exact surveys, by systematic dredging, the organization of the system of conveying information of changes to Pilots, improved lighting, and increase of navigational marks, the Commissioners have contributed very largely towards mitigating the danger and difficulties of the Hooghly. Credit is jointly due to successive Deputy Conservators, that so much has been done, and to the Officers of the Bengal Pilot Service, that the record of casualties to vessels in their charge has been so consis-

tently low in a river where the difficulties to be encountered are so numerous and the risks so great.

At the time of writing the Calcutta Port Trust has been in existence for 54 years. As its inception in 1869 the first body of Trustees took over 4 screw-pile jetties near Armenian Ghat which were fitted with steam cranes and small sheds and had cost altogether a little over Rs. 5 lakhs, while there were two more jetties in process of construction and there was also a wharf for inland vessels, together with an office and some minor works. The total block of the Trust then represented a capital of about Rs. 10 lakhs. During the first six months' work 52 vessels were accommodated at the Jetties, while the aggregate tonnage entering the Port, including all vessels which unloaded or loaded in the stream, was just under 1,000,000 tons. The gross receipts of this period were little over Rs. 2 lakhs.

Conclusion.

At the present time the Trust possesses 9 jetty berths and a heavy-lift yard along the Strand Road, and an additional 5 berths at Garden Reach, while there are 27 berths in the two sections of the Kidderpore Docks. It has in addition 77 sets of double moorings for ocean-going steamers, 78 sets of moorings for smaller craft, 15 swinging moorings in this river and 7 buoy moorings in the Docks. It has two large Dry-docks and one smaller one for the repair of ocean-going vessels. At Budge-Budge it has a complete depot for the landing and storage of petroleum and petrol, with 7 moorings for oil-tank ships or for vessels which desire to bunker with oil. All the jetty and dock berths are provided with quay and yard cranes and lift equipment, with direct railway connections to the sheds and quays

and trolley lines for the movement of heavy packages. It has two floating cranes with a capacity of 60 and 30 tons respectively, and a 100 ton sheer-legs. It has also a modern fire-float for use in the event of fire on ships or on the river banks or in the Docks. It maintains a fleet of over 130 vessels, comprising 3 large suction dredgers for use in the lower reaches and other bucket and suction dredgers for use in the Port, two ocean-going tugs, a Despatch Vessel, passenger and ferry steamers, launches, tugs and other small craft. It provides and maintains a large number of pontoon landing-stages for the disembarking and embarking of passengers from ocean-going vessels and from river and ferrry steamers, the largest of which, that at Outram Ghat, is immediately opposite the Eden Gardens. It possesses its own railway system covering the whole of the working area of the Trust and giving direct connection with the three broad-gauge railways which serve the Port, as well as providing facilities for the movement of goods within its own area by means of its own rolling stock, comprising 62 locomotives and nearly 2000 wagons. It has extensive workshops, slipways and dry-docks for the repair and maintenance of its own vessels and plant It owns nearly 4000 acres of land in Calcutta and Howrah, a large part of which is river-side property and a substantial proportion of which is let out for various trade purposes. It provides work for over 8000 permanent employes, in addition to the large number regularly employed in its Workshops and that temporarily employed on the construction of the King George's Docks. In a normal year some 1200 or more vessels with a gross tonnage of about 6 million tons enter and leave the Port and the total of the goods

handled is between 5 and 6 million tons, while the value of the merchandise dealt with is approximately Rs. 35 crores, exclusive of treasure.

The jurisdiction of the Commissioners comprises two portions of the river :—

(*a*) the port proper which extends from Konnagar to Budge-Budge, and

(*b*) the port approaches which extend from Khulna in the Nadia district to Calcutta and from Calcutta to the Eastern Channel floating light vessel,

and the powers of the Trust are controlled by a body of 16 Commissioners, comprising a Chairman and Deputy Chairman, and 14 elected or nominated Commissioners representative of Shipping and trading interests, the Railways, the Customs Department, the Corporation and the Royal Indian Marine.

APPENDIX C.

BENGAL TELEPHONE CORPORATION, LTD.

Head Office, 8, Hare Street.

EXHIBITION EXCHANGE.

Telephone No.	Name.	
1.	Police.	
2.	Fire Brigade.	
3.	"Englishman," Ltd., The.	
4.	Ahmuty & Co., Ltd.	(Misc.)
5.	Ahmuty & Co., Ltd.	(Engineering)
6.	Parry & Co.	(Food)
7.	Parry's Engineering, Ltd.	(Engineering)
8.	Martin & Co.	
9.	King, John & Co., Ltd.	
10.	Jessop & Company, Limited.	
11.	Herbert, Alfred, (India), Ltd.	
12.	English Electric Co., Ltd.	
13.	Army & Navy Stores.	
14.	Incell & Silk.	
15.	Fairbairn Lawson Combe Barbour (India) Ltd.	
16.	Banerjea, K.	
17.	Mirrlees, Watson Co., Ltd., The	
18.	Jones, Ivan & Co.	
19.	Crossley Bros., Ltd.	
20.	Henley's Telegraph Works Co., Ltd., W.T.	
21.	British Arc Welding Co. (India) Ltd.	
22.	Avery, W. & T. Ltd.	

Telephone No.	Name.
23.	Ingersoll-Rand (India), Ltd.
24.	Symington Cox & Co., Ltd.
25.	Bengal Luxmi Cotton Mills, Ltd., The
26.	Shellim, A. J., & Co.
27.	American Eastern Tobacco Corporation.
28.	Waldie, D., & Co.,
29.	Butto Kristo Paul & Co.
30.	"Calcutta Pottery Works."
31.	Bird & Co.
32.	Lakhiraj Sheokram & Co.
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Telephone No.	Name.
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59.	
60.	
61.	Sen, N. N., Kaviraj.
62.	Bevan, T. E., & Co.
63.	Bengal Canning & Condiment Works, Ld
64.	Britannia Biscuit Co., Ld., The
65.	Firpo, A., Ltd.
66.	Allen & Hanbury's Ltd.
67.	Muller & Phipps (India), Ltd.
68.	Indian Wire Netting Factory.
69.	Gokuldass Gobardhandass.
70.	Hursookh Dass Thakurdass.
71.	Charan Dass Harnam Dass.
72.	Shambunath Ramlall.
73.	Matri Bhandar.
74.	Laurel Novelty Co., The
75.	Monaff, H. A.
76.	Mukerjee, R. N.
77.	Continental Sports Co.
78.	Fire Bricks & Tile Syndicate.
79.	Jagganath Nathmull.
80.	Indian Ladies' Section. (Exhibition Committee).
81.	European Ladies' Section. (Exhibition Committee).
82.	Bengal Chemical & Pharmaceutical Works, Ld.
83.	Marwari Relief Society.

Telephone No.	Name.
84.	Hotchand Motumal.
85.	Mohendra Brothers.
86.	Lucky Bag Committee.
87.	Kaiser-I-Hind Woolen, Cotton & Silk Mills.
88.	Lassoo & Sons.
89.	Gufforfoo & Sons.
90.	Oriental Electric & Engineering Co., The
91.	British Empire Exhibition, Commissioner of.
92.	Goonamall Parashram.
93.	
94.	

BENGAL TELEPHONE CORPORATION, LTD.

Head Office, 8 Hare Street.

EXHIBITION EXCHANGE.

Telephone No.	Name.	
	A	
4.	Ahmuty & Co., Ltd.	(Misc.)
5.	Ahmuty & Co., Ltd.	(Engineering)
66.	Allen & Hanbury's Ltd.	
27.	American Eastern Tobacco Corporation.	
13.	Army & Navy Stores.	
22.	Avery, W. & T. Ltd.	
	B	
16.	Banerjea, K.	
63.	Bengal Canning & Condiment Works, Limited.	
82.	Bengal Chemical & Pharmaceutical Works, Ltd.	
25.	Bengal Luxmi Cotton Mills, Ltd. The	
62.	Bevan, T. E. & Co.	
31.	Bird & Co.	
64.	Britannia Biscuit Co., Ltd., The	
21.	British Arc Welding Co. (India) Ltd.	
91.	British Empire Exhibition, Commissioner of.	
29.	Butto Kristo Paul & Co.	

Telephone No.	Name.
	C
30.	"Calcutta Pottery Works."
71.	Charan Dass Harnam Dass.
77.	Continental Sports Co.
19.	Crossley Bros., Ltd.
12.	English Electric Co., Ltd.
3.	"Englishman," Ltd., The
81.	European Ladies' Section. (Exhibition Committee).
15.	Fairbairn Lawson Combe Barbour (India) Ltd.
2.	Fire Brigade.
78.	Fire Bricks & Tile Syndicate.
65.	Firpo, A., Ltd.
	G
69.	Gokuldass Gobardhandass.
92.	Goonamall Parashram.
89.	Gufforfoo & Sons.
20.	Henley's Telegraph Works Co., Ltd., W.T.
	H
11.	Herbert, Alfred, (India), Ltd.
84.	Hotchand Motumal.
70.	Hursook Dass Thakurdass.

Telephone No.	Name.
	I
14.	Incell & Silk.
80.	Indian Ladies' Section. (Exhibition Committee).
68.	Indian Wire Netting Factory.
23.	Ingersoll-Rand (India), Ltd.
	J
79.	Jagganath Nathmull.
10.	Jessop & Company, Limited.
18.	Jones, Ivan & Co.
	K
87.	Kaiser-I-Hind Woolen, Cotton & Silk Mills.
9.	King, John, & Co., Ltd.
	L
32.	Lakhiraj Sheokram & Co.
88.	Lassoo & Sons.
74.	Laurel Novelty Co., The
86.	Lucky Bag Committee.
8.	Martin & Co.
	M
83.	Marwari Relief Society.
73.	Matri Bhandar.
17.	Mirrlees, Watson Coy., Ltd., The
85.	Mohendra Brothers.

Telephone No.	Name.
75.	Monaff, H. A.
76.	Mukerjee, R. N.
67.	Muller & Phipps (India), Ltd.
	O
90.	Oriental Electric & Engineering Co., The
6.	Parry & Co. (Food)
7.	Parry's Engineering, Ltd. (Engineering)
1.	Police.
	S
61.	Sen, N. N., Kaviraj.
72.	Shambunath Ramlal.
26.	Shellim, A. J., & Co.
24.	Symington Cox & Co., Ltd.
	W
28.	Waldie, D., & Co.

APPENDIX D.

RAW PRODUCTS.

Mineral Collection.

In Section "A", there will be found a Collection of Important Economic Minerals, from the various provinces of India and Burma.

The collection has been lent by the Geological Section of the Indian Museum, and is divided into the following groups :—

Building and Ornamental Stones.
Compounds of Carbon, including Petroleum.
,, ,, Phosphorus.
,, ,, Sulphur.
,, ,, Sodium.
,, ,, Potassium.
,, ,, Barium.
,, ,, Magnesium.
,, ,, Aluminium.
,, ,, Chromium.
,, ,, Manganese.
,, ,, Iron.
,, ,, Nickel.
,, ,, Cobalt.
,, ,, Tungsten.
,, ,, Zinc.
,, ,, Lead.
,, ,, Tin.
,, ,, Bismuth.
,, ,, Antimony.
,, ,, Arsenic.
,, ,, Copper.
,, ,, Lead.
,, ,, Silver.

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